ELECTRON TUBES

CBS

SEMICONDUCTORS®

TECHNICIAN'S HANDBOOK

CBS-HYTRON
Danvers, Massachusetts

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★Complete data for tubes which are identical except for heater ratings are listed under that type which has the lowest heater voltage.

Complete electrical data from RETMA registrations are given; mechanical data and characteristics curves are given in the CBS Engineer's Handbook. For additional information on a particular tube or semiconductor, write to Technical Information Service, CBS-Hytron, Danvers, Massachusetts.

CBS-HYTRON ELECTRON TUBES
AND SEMICONDUCTORS

1959
TECHNICIAN'S HANDBOOK

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CBS-HYTRON
DIVISION OF COLUMBIA BROADCASTING SYSTEM, INC.
DANVERS, MASSACHUSETTS

PREFACE

The CBS Technician's Handbook is especially prepared for the technician, experimenter, and radio amateur. It includes all receiving tubes that will be encountered in servicing American radio and television sets and most audio equipment. Full data treatment is given to those types that constitute 90% of the replacement market and those being employed in new equipment. For compactness, other types rarely encountered are presented in chart form.

For maximum usefulness in a convenient size volume, this handbook is designed for: completeness . . . easy readability . . . quick reference . . . compactness. It features original foolproof basing diagrams.

Because the service technician's efforts are expanding into diverse fields, the more popular special purpose tubes used in communications, industry, and special electronic devices are included in this volume in quick reference chart form. The abbreviated data have been selected for maximum usefulness. Additional information on the types listed will be furnished upon request.

This publication was prepared by CBS-Hytron Technical Information Service, 100 Endicott Street, Danvers, Massachusetts.

CBS

RECEIVING TUBES

(Numerical-Alphabetical Order)

With cross indexing to Reference Guides
for Seldom-Used Tubes.

NOTE: Complete data for tubes which are identical except for heater ratings are listed under that type which has the lowest heater voltage.

CBS ELECTRON TUBES

CBS®

ADDITIONAL TUBE TYPES

NEW TYPE*	PROTOTYPE	DIFFERENCE
3BN4	2BN4	Heater characteristic, 450 ma. at 2.8 volts, warm-up controlled.
4CS6	6CS6	Heater characteristic, 450 ma. at 4.2 volts, warm-up controlled.
5AS4A	5AS4	T-12, straight sided bulb; overall length 4¼″.
5BQ7A	4BQ7A	Heater characteristic, 450 ma. at 5.6 volts, warm-up controlled.
5BS8	4BS8	Heater characteristic, 450 ma. at 5.6 volts, warm-up controlled.
6AT8A	6AT8	Controlled warm-up time
6AU6A	6AU6	Controlled warm-up time
6AU8A	6AU8	Controlled plate knee characteristic; $E_b = 40V$, $E_{c2} = 125V$, $E_{c1} = 0V$, $I_b = 30$ ma, $I_{c2} = 10$ ma.
6BE8A	6BE8	Controlled warm-up time
6CB6A	6CB6	Controlled warm-up time
6CG8A	6CG8	Controlled warm-up time
6J6A	6J6	Controlled warm-up time
6T8A	6T8	Controlled warm-up time
6U8A	6U8	Controlled warm-up time
6V6GTA	6V6GT	Controlled warm-up time
6X8A	6X8	Controlled warm-up time
11C5	35C5	Heater characteristic, 450 ma. at 11.6 volts, warm-up controlled.
12CU5	6CU5	Heater characteristic, 600 ma. at 12.6 volts, warm-up controlled.
17BQ6GTB	6BQ6GTB	Heater characteristic, 450 ma. at 16.8 volts, warm-up controlled.
25CD6GB	6CD6GA	Heater characteristic, 600 ma. at 25 volts, warm-up controlled.

*Identical to prototype except for difference given.

CBS ELECTRON TUBES

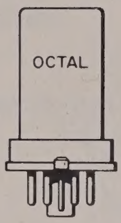
01 • 01A • 01AA • 01B • 00 • 00A

(See chart for seldom-used tubes)

CBS

0Z4

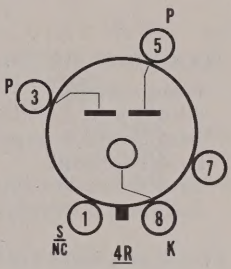
0Z4A • 0Z4G



Gaseous full-wave rectifier for vibrator-type B supplies

HEATER CHARACTERISTICS

Heater voltage......	NONE REQUIRED
Heater current......	NONE REQUIRED



ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

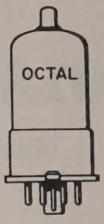
	0Z4,0Z4G	0Z4A	
Plate supply voltage, peak starting..........	300		volts
Plate to plate voltage, peak...............	1000		volts
Plate voltage, peak inverse............................		880	volts
Plate current, peak..........................	200		ma
Output voltage, d-c..........................	300	300	volts
Output current, d-c (min.).....................	30	30	ma
Output current, d-c (max.).....................	75	85	ma
Dynamic tube voltage drop, average..........	24	24	volts

1A3 • 1A4P/T • 1A5G/GT • 1A6

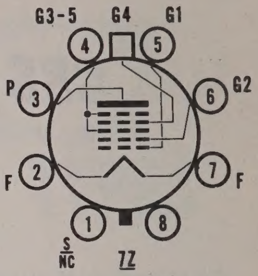
(See chart for seldom-used tubes)

CBS

1A7GT



Radio-frequency converter for portable battery powered receivers



FILAMENT CHARACTERISTICS

Voltage, a-c or d-c	1.4	volts
Current	50	ma

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Plate voltage	110	volts
Grid 3 and 5 voltage	60	volts
Grid 3 and 5 supply voltage	110	volts
Grid 2 voltage	110	volts
Grid 4 circuit resistance, minimum	1.0	meg
Cathode current, total	4.0	ma

CHARACTERISTICS AND TYPICAL OPERATION

Converter Service (Separate excitation)

Plate voltage	90	volts
Grid 2 (signal grid) voltage	90	volts
Grid 3 and 5 (oscillator anode) voltage*	45	volts
Grid 4 voltage	0	volts
Grid 1 (oscillator grid) resistor	0.2	meg
Plate resistance (approx.)	0.6	meg
Conversion transconductance	250	µmhos
Cathode current	2.5	ma
Plate current	0.6	ma
Grid 3 and 5 (oscillator anode) current	0.7	ma
Grid 2 current	1.2	ma
Grid 1 (oscillator grid) current	0.035	ma

Oscillator Characteristics, Not Oscillating

Plate voltage	90	volts
Grid 2 voltage	90	volts
Grid 3 and 5 (oscillator anode) voltage	45	volts
Grid 4 voltage	0	volts
Grid 1 (oscillator grid) voltage	0	volts
Transconductance between grid 1 and grid 2	550	µmhos
Amplification factor between grid 1 and grid 2	40	
Cathode current	2.2	ma

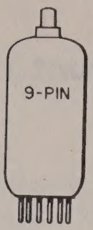
NOTE:

*Obtained preferably by using a properly by-passed 70,000 ohm resistor in series with a 90-volt supply.

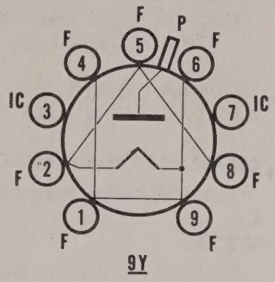
1AB5 • 1AF4 • 1AF5

(See chart for seldom-used tubes)

CBS 1AX2



Half-wave power rectifier for cathode-ray-tube anode supplies



FILAMENT CHARACTERISTICS

Voltage, a-c or d-c*	1.4	volts
Current	0.65	amp

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Filament to plate	0.55	μμf

MAXIMUM RATINGS (Design center values unless noted)
Rectifier Service†

Plate voltage, peak inverse (absolute max.)	25,000	volts
Output current, d-c	1.0	ma
Plate current, peak steady state	11.0	ma

TYPICAL OPERATION
TV Pulse Rectifier

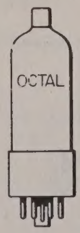
Plate voltage, positive pulse	20,000	volts
Plate voltage, negative pulse	5000	volts
Output current, d-c	0.3	ma
Output voltage, d-c	20,000	volts

NOTES:

*Should not be less than 1.2 volts nor more than 1.6 volts.

†Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

CBS 1B3GT

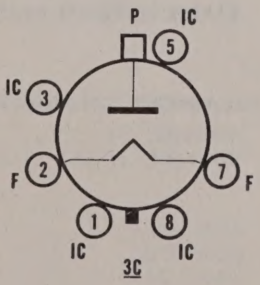


H-w rectifier for cathode-ray-tube anode supplies

FILAMENT CHARACTERISTICS

Voltage, a-c or d-c★	1.25	volts
Current	0.2	amp

★Must not exceed 1.45 volts or be less than 1.05 volts.



1B3GT (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Plate to filament: p to f + i.s.	1.3	μμf

MAXIMUM RATINGS (Design center values unless noted)

Flyback Rectifier Service*

Plate voltage, peak inverse		
Total d-c and peak (absolute max.)	26	kv
D-c	21	kv
Output current, d-c	0.5	ma
Plate current, peak steady state	50	ma

CHARACTERISTICS

Tube voltage drop conducting 7 ma	100	volts

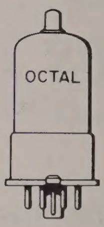
NOTE:

*Voltage pulse duration must not exceed 10 μs in a 30-frame, 525-line system.

1B4/951 • 1B4P/T • 1B5/25S 1B6 • 1B7G/GT • 1B8GT 1C5G/GT • 1C6 • 1C7G • 1C8 1D5GP/GT • 1D7G • 1D8GT 1E4/G • 1E5GP • 1E5G/GT 1E7G/GT • 1F4 • 1F5G • 1F6 1F7G/GH/GV • 1G4G/GT 1G5G/GT • 1G6G/GT 1H4G/GT

(See chart for seldom-used tubes)

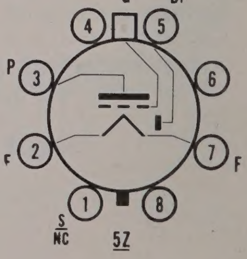
CBS 1H5GT



Detector and audio amplifier for battery-type receivers

FILAMENT CHARACTERISTICS

Voltage, d-c	1.4	volts
Current	50	ma



1H5GT (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield♦

Grid to plate: g1 to p	1.1	μμf
Input: g1 to f + b.s.	0.75	μμf
Output: p to f + b.s.	4.6	μμf

♦JETEC shield 308 connected to negative filament terminal.

MAXIMUM RATINGS (Design center values)

Plate voltage	110	volts
Diode operation current	0.25	ma

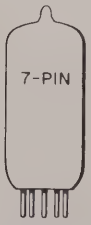
CHARACTERISTICS AND TYPICAL OPERATION
Class A Amplifier

Plate voltage	67.5	90	volts
Control-grid voltage	0	0	volts
Plate resistance (approx.)	0.30	0.24	meg
Transconductance	210	275	μmhos
Amplification factor	60	65	
Plate current	0.06	0.15	ma
Average diode current with 10 volts d-c applied	1.5	1.5	ma

1H6G/GT • 1J5G • 1J6G/GT

(See chart for seldom-used tubes)

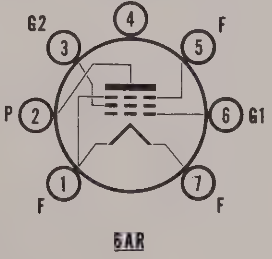
CBS 1L4



R-f or i-f amplifier for battery-powered receivers

FILAMENT CHARACTERISTICS

Voltage, d-c	1.4	volts
Current	50	ma



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	0.008	μμf
Input: g1 to f + g2 + g3	3.6	μμf
Output: p to f + g2 + g3	7.5	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	110	volts
Grid 2 voltage	90	volts
Grid 2 supply voltage	110	volts
Grid 1 voltage	0	volts
Cathode current	6.5	ma

1L4 (cont.)

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	90	90	volts
Grid 2 (screen) voltage	67.5	90	volts
Grid 1 (control-grid) voltage	0	0	volts
Plate resistance	0.6	0.35	meg
Transconductance	925	1025	μmhos
Plate current	2.9	4.5	ma
Grid 2 current	1.2	2.0	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−6.0	−8.0	volts

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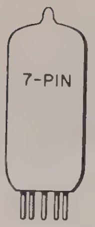
1L6 • 1LA4/E • 1LA6 • 1LB4 1LB6 • 1LC5 • 1LC6 • 1LD5 1LE3 • 1LF3 • 1LG5 • 1LH4 1LN5 • 1N5GT

(See chart for seldom-used tubes)

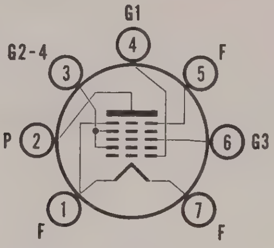
1N6G • 1P5GT/G • 1Q5GT/G 1Q6 • 1R4

(See chart for seldom-used tubes)

CBS 1R5



Radio frequency converter for portable battery powered receivers



7AT

FILAMENT CHARACTERISTICS

Voltage, d-c	1.4	volts
Current	50	ma

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Signal grid to mixer plate: g3 to p	0.4	μμf
R-f input: g3 to all others	7.0	μμf
Mixer output: p to all others	7.5	μμf
Oscillator input: g1 to all others	3.8	μμf
Oscillator grid to mixer plate: g1 to p, max.	0.10	μμf
Oscillator grid to signal grid: g1 to g3, max.	0.2	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	90	volts
Grid 2 and 4 voltage	67.5	volts
Grid 2 and 4 supply voltage	90	volts
Grid 3 voltage	0	volts
Cathode current, total	5.5	ma

CHARACTERISTICS AND TYPICAL OPERATION

Converter Service (Separate excitation)

Plate voltage	45	67.5	90	volts
Grid 3 (signal grid) voltage	0	0	0	volts
Grid 2 and 4 (oscillator anode) voltage	45	67.5	67.5	volts
Grid 1 (oscillator grid) resistor	0.1	0.1	0.1	meg
Grid 1 (oscillator grid) voltage, rms	15	25	25	volts
Plate resistance (approx.)	0.5	0.4	0.4	meg
Conversion transconductance	210	280	280	μmhos
Cathode current	3.0	5.2	5.3	ma
Plate current	0.7	1.4	1.5	ma
Grid 2 and 4 (oscillator anode) current	2.1	3.5	3.5	ma
Grid 1 (oscillator grid) current	0.15	0.25	0.25	ma
Grid 3 voltage (approx.) for $g_c = 10\ \mu$mhos	−7.0	−13	−13	volts
Grid 3 voltage (approx.) for $g_c = 100\ \mu$mhos	−2.2	−4.9	−5.0	volts

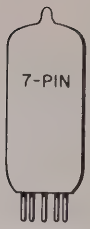
Oscillator Characteristics, Not Oscillating

Plate voltage	67.5	volts
Grid 3 voltage	0	volts
Grid 2 and 4 (oscillator anode) voltage	67.5	volts
Grid 1 (oscillator grid) voltage	0	volts
Transconductance between grid 1 and grids 2 + 4 connected to plate	1400	μmhos
Amplification factor between grid 1 and grids 2 + 4 connected to plate	6.5	
Cathode current	9.0	ma
Grid 1 voltage (approx.) for $I_b \doteq 10\ \mu$a	17	volts

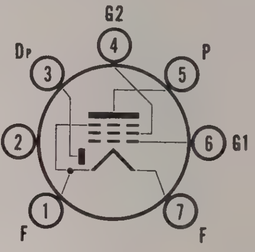
1S4

(See chart for seldom-used tubes)

CBS 1S5



Diode detector—pentode voltage amplifier for audio service in battery powered receivers



6AU

FILAMENT CHARACTERISTICS

Voltage, d-c	1.4	volts
Current	50	ma

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No shield	Shield♦	
Grid to plate: g1 to p, max.	0.2		μμf
Input: g1 to f + g2 + g3	2.2		μμf
Output: p to f + g2 + g3	2.4		μμf
Diode plate to grid 1: dp to g1, max.	0.1	0.1	μμf

♦JETEC shield 316 connected to pin 1

MAXIMUM RATINGS (Design center values)

Plate voltage	90	volts
Grid 2 voltage	90	volts
Grid 1 voltage, negative d-c	—50	volts
Grid 1 voltage, positive d-c	0	volts
Cathode current	3.0	ma
Diode current for continuous operation	0.25	ma

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	67.5	volts
Grid 3 (suppressor)	connected to filament at socket	
Grid 2 supply voltage	67.5	volts
Grid 1 (control-grid) voltage	0	volts
Plate resistance (approx.)	0.6	meg
Transconductance	625	μmhos
Plate current	1.6	ma
Grid 2 current	0.4	ma
Grid 1 voltage (approx.) for $I_b = 10$ μa	—5	volts
Diode current, av., at 10 volts d-c	1.5	ma

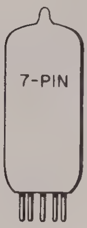
Pentode unit as resistance coupled amplifier

Plate supply voltage	45	90	volts
Grid 2 supply voltage	45	90	volts
Grid 1 voltage	0	0	volts
Plate load resistor	470,000	470,000	ohms
Grid 1 resistor	10	10	meg
Grid 2 series resistor	2.2	2.2	meg
Grid 2 by-pass capacitor	0.1	0.1	μf
Input capacitor	0.01	0.01	μf
Output capacitor	0.01	0.01	μf
Grid resistor of following stage	1.0	1.0	meg
Signal source impedance	1000	1000	ohms
Distortion	5	5	%
Output voltage	5.5	17.0	volts
Voltage gain at 400 cps	33	50	

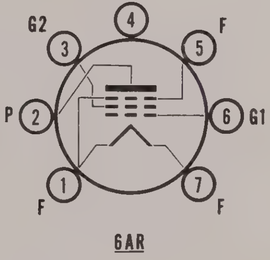
1SA6GT • 1SB6GT

(See chart for seldom-used tubes)

CBS 1T4



Pentode voltage amplifier for r-f or i-f service in battery powered receivers



FILAMENT CHARACTERISTICS

Voltage, d-c	1.4	volts
Current	50	ma

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No shield	Shield♦	
Grid to plate: g1 to p, max.	0.01	0.01	μμf
Input: g1 to f + g2 + g3 + i.s.	3.6	3.6	μμf
Output: p to f + g2 + g3 + i.s.	7.5	7.5	μμf

♦JETEC shield 316 connected to pin 1

MAXIMUM RATINGS (Design center values)

Plate voltage	90	volts
Grid 2 voltage	90	volts
Grid 1 voltage, positive d-c	0	volts
Cathode current	5.5	ma

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	45	67.5	90	90	volts
Grid 3 (suppressor)	connected to filament at socket				
Grid 2 (screen) voltage	45	67.5	45	67.5	volts
Grid 1 (control-grid) voltage	0	0	0	0	volts
Plate resistance (approx.)	0.35	0.25	0.8	0.5	meg
Transconductance	700	875	750	900	μmhos
Plate current	1.7	3.4	1.8	3.5	ma
Grid 2 current	0.7	1.5	0.65	1.4	ma
Grid 1 voltage (approx.) for $g_m = 10$ μmhos	−10	−16	−10	−16	volts

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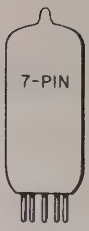
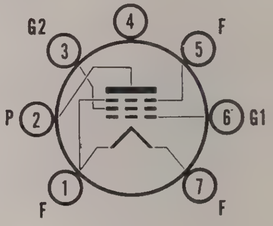
1T5GT

(See chart for seldom-used tubes)

CBS 1U4



Pentode voltage amplifier for r-f, i-f and audio service in battery powered receivers



6AR

FILAMENT CHARACTERISTICS

Voltage, d-c	1.4	volts
Current	50	ma

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No shield	Shield♦	
Grid to plate: g1 to p, max.	0.01	0.01	μμf
Input: g1 to f + g2 + g3 + i.s.	3.6	3.6	μμf
Output: p to f + g2 + g3 + i.s.	7.5	7.5	μμf

♦JETEC shield 316 connected to pin 1 or pin 5

MAXIMUM RATINGS (Design center values)

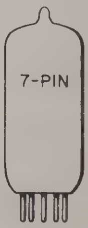
Plate voltage	110	volts
Grid 2 voltage	110	volts
Grid 1 voltage, positive d-c	0	volts
Cathode current	6.0	ma

CHARACTERISTICS AND TYPICAL OPERATION

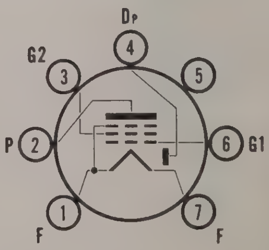
Class A Amplifier

Plate voltage	90	volts
Grid 3 (suppressor)	connected to filament at socket	
Grid 2 (screen) voltage	90	volts
Grid 1 (control-grid) voltage	0	volts
Plate resistance (approx.)	1.0	meg
Transconductance	900	μmhos
Plate current	1.6	ma
Grid 2 current	0.45	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−4	volts

CBS 1U5



Diode detector—pentode voltage amplifier for audio service in battery powered receivers



6BW

FILAMENT CHARACTERISTICS

Voltage, d-c	1.4	volts
Current	50	ma

1U5 (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No shield	Shield♦	
Grid to plate: g1 to p, max.	0.2		μμf
Input: g1 to f + g2 + g3	2.2		μμf
Output: p to f + g2 + g3	2.4		μμf
Diode plate to grid 1: dp to g1, max.	0.04	0.04	μμf

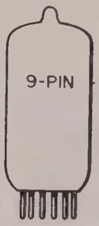
♦JETEC shield 316 connected to pin 1

Type 1U5 is identical to type 1S5 except for basing and capacitances.

1U6 • 1V

(See chart for seldom-used tubes)

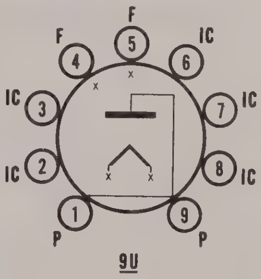
CBS 1V2



Half-wave rectifier for cathode-ray-tube anode supplies

FILAMENT CHARACTERISTICS

Voltage, a-c†	0.625	volt
Current	0.3	amp



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCE

Plate to filament	0.8	μμf

MAXIMUM RATINGS (Design center values)
Pulsed Rectifier Service*

Plate voltage		
Total d-c and peak (absolute max.)	8.25	kv
D-c	6.6	kv
Plate current, peak steady state	10	ma
Plate current, average	0.5	ma

CHARACTERISTICS

Tube drop conducting 7 ma, approx.	135	volts

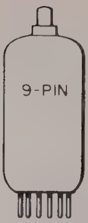
†Should not exceed .725 volts nor be less than .525 volts.

*Voltage pulse duration must not exceed 10μs in a 525-line, 30 frame system.

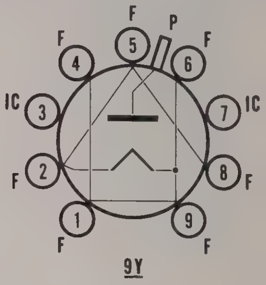
1W4

(See chart for seldom-used tubes)

CBS 1X2
1X2A



Half-wave rectifier for cathode-ray-tube anode supplies



FILAMENT CHARACTERISTICS

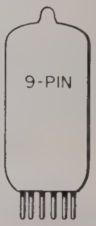
Voltage, a-c or d-c	1.25 volts
Current	0.2 amp

MAXIMUM RATINGS (Absolute maximum value)

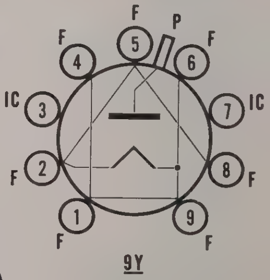
	1X2	1X2A	
Plate voltage, peak inverse	15	20	kv

Types 1X2 and 1X2A are identical to type 1X2B except for lower peak inverse plate voltage.

CBS 1X2B



Half-wave rectifier for cathode-ray-tube anode supplies



FILAMENT CHARACTERISTICS

Voltage, a-c or d-c	1.25 volts
Current	0.2 amp

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCE

Plate to filament	1.0	µµf

MAXIMUM RATINGS (Design center values unless noted)

Flyback Rectifier Service*

Plate voltage, peak inverse (absolute max.)	22	kv
Output current, d-c	0.5	ma
Plate current, peak steady state	45	ma

CHARACTERISTICS

Tube Voltage Drop

Conducting 7 ma	100	volts

TYPICAL OPERATION

Flyback Rectifier Service*

Peak plate voltage, positive	18	kv
Peak plate voltage, negative	2,000	volts
Output voltage, d-c	18	kv
Peak plate current	35	ma
Output current, d-c	0.1	ma

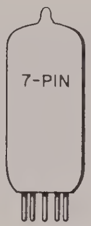
NOTES:

*Voltage pulse duration must not exceed 10μs in a 525-line, 30-frame system.

2A3/2A3H • 2A5 • 2A6 • 2A7/S

(See chart for seldom-used tubes)

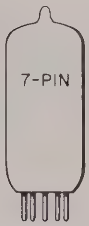
CBS 2AF4



Triode for uhf local oscillator service, heater warm-up controlled for series strings

Type 2AF4 is identical to type 2AF4A except for bulb length.

CBS 2AF4A



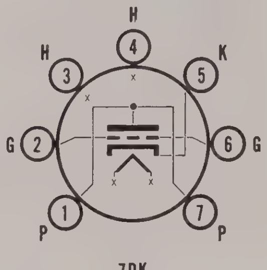
Triode for uhf local oscillator service, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	2.35	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	50	volts
Heater positive to cathode★	50	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 25 volts max.



7DK

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	1.9	μμf
Input: g1 to k + h	2.2	μμf
Output: p to k + h	0.45	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	150	volts
Control-grid voltage, negative d-c	—50	volts
Control-grid current, d-c	8.0	ma
Plate input	2.5	watts
Plate dissipation	2.25	watts
Cathode current	28	ma
Control-grid circuit resistance		
Fixed bias	Not recommended	
Self bias	0.5	meg

2AF4A (cont.)

CHARACTERISTICS

Class A_1 Amplifier

Plate voltage	80	100	volts
Cathode-bias resistor	150	150	ohms
Plate resistance (approx.)	2270	2130	ohms
Transconductance	6600	7500	μmhos
Amplification factor	15	16	
Plate current	16	20	ma

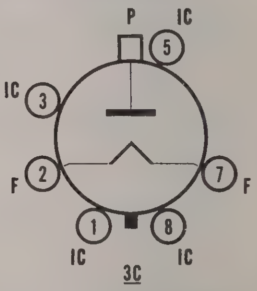
TYPICAL OPERATION

Oscillator at 950 megacycles

Plate voltage	100	volts
Control-grid voltage	—4	volts
Control-grid resistor	10,000	ohms
Plate current	22	ma
Control-grid current	0.4	ma
Power output	160	mw

2B3

H-w rectifier for cathode-ray-tube anode supplies



FILAMENT CHARACTERISTICS

Voltage, a-c or d-c★	1.75	volts
Current	0.25	amp

★Must not exceed 2.0 volts or be less than 1.5 volts.

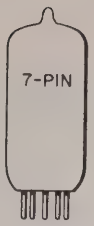
Type 2B3 is identical to type 1B3 except for filament characteristics and basing.

2B7/S

(See chart for seldom-used tubes)

CBS

2BN4

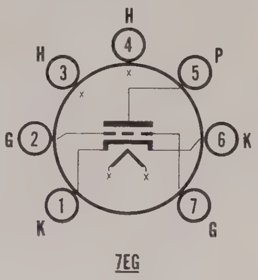


R-f amplifier in vhf television tuners, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	2.3	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode	100	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield♦

Grid to plate: g1 to p	1.2	μμf
Input: g1 to k + h	3.2	μμf
Output: p to k + h	1.4	μμf
Heater to cathode: h to k	2.8	μμf

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design maximum values)

Plate voltage	275	volts
Control-grid voltage, positive d-c	0	volts
Plate dissipation	2.2	watts
Cathode current	22	ma
Control-grid circuit resistance	0.5	meg

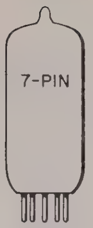
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

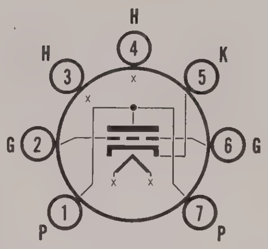
Plate voltage	150	volts
Cathode-bias resistor	220	ohms
Plate resistance (approx.)	6300	ohms
Transconductance	6800	μmhos
Amplification factor	43	
Plate current	9.0	ma
Control-grid voltage (approx.) for I_b = 100 μa	—6.0	volts

CBS

2T4



Triode for uhf local oscillator service, heater warm-up controlled for series strings



7DK

HEATER CHARACTERISTICS

Voltage, a-c or d-c	2.35	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	50	volts
Heater positive to cathode★	50	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 25 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No shield	Shield⧫	
Grid to plate: g1 to p	1.7	1.7	μμf
Input: g1 to k + h	3.3	2.9	μμf
Output: p to k + h	1.8	0.25	μμf
Heater to cathode†	2.9	3.0	μμf
Grid to cathode†	2.6	2.6	μμf
Plate to cathode†	0.18	0.2	μμf
Grounded grid operation			
Input	5.7	5.5	μμf
Output	3.4	1.8	μμf

⧫JETEC shield 316 connected to cathode.

†Measured between specified elements only. When external shield is used it shall be grounded.

MAXIMUM RATINGS (Design center values)

Plate voltage	200	volts
Control-grid current, d-c	3.0	ma
Plate dissipation	3.5	watts
Cathode current	30	ma

CHARACTERISTICS

Class A Amplifier

Plate voltage	80	volts
Cathode-bias resistor	150	ohms
Plate resistance (approx.)	1860	ohms
Transconductance	7000	μmhos
Amplification factor	13	
Plate current	18	ma
Control-grid voltage (approx.) for I_b = 50 μa	—15	volts

TYPICAL OPERATION

Oscillator at 950 megacycles

Plate voltage	80	volts
Control-grid voltage (self bias)	—4	volts
Control-grid resistor	10,000	ohms
Plate current	18	ma
Control-grid current	400	μa

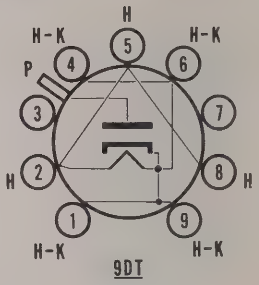
2V2 • 2V3G • 2W3/GT • 2Z2/G84

(See chart for seldom-used tubes)

CBS

3A2

Half-wave rectifier for cathode-ray-tube anode supplies


H
H-K
H-K
P
4
5
6
3
7
H
2
8
H
1
9
H-K
H-K
9DT

HEATER CHARACTERISTICS

Voltage, a-c	3.15	volts
Current	0.22	amp

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCE

Plate to cathode, heater, and internal shield: p to k + h + i.s.	1.0	μμf

MAXIMUM RATINGS (Design center values)

TV Pulse Rectifier Service*

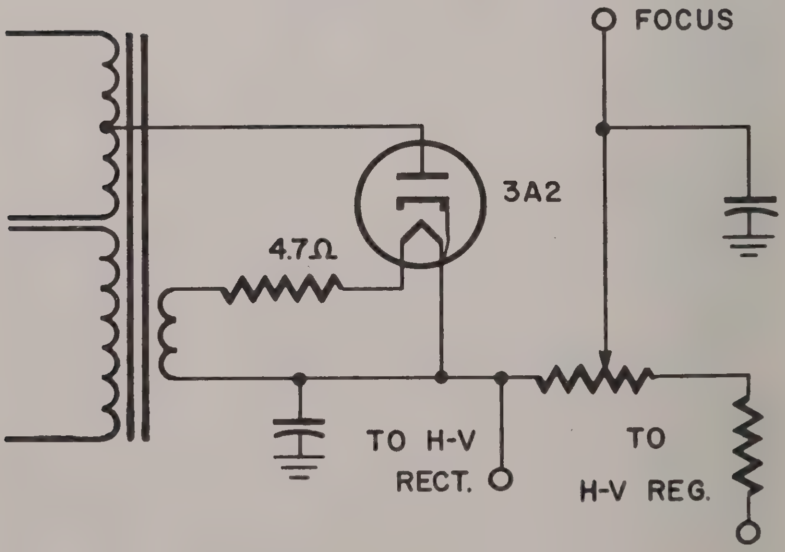
Plate voltage, peak inverse	18	kv
Plate current, peak steady state	80	ma
Plate current, average	1.5	ma

NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

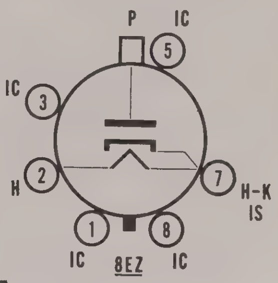
TYPICAL CIRCUIT

TRI-COLOR FOCUS RECT.


FOCUS
3A2
4.7Ω
TO H-V
RECT.
TO
H-V REG.

CBS 3A3

Half-wave rectifier for tricolor cathode-ray-tube anode supplies



HEATER CHARACTERISTICS

Voltage, a-c	3.15	volts
Current	0.22	amp

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCE

Plate to cathode, heater, internal shield: p to k + h + i.s.	1.5	$\mu\mu$f

MAXIMUM RATINGS (Design center values)
TV Pulse Rectifier Service*

Plate voltage, peak inverse	30	kv
Plate current, peak steady state	80	ma
Plate current, average	1.5	ma

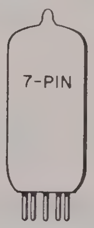
NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

3A5 • 3A8GT

(See chart for seldom-used tubes)

CBS 3AL5



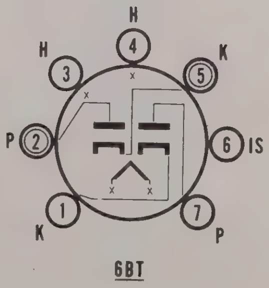
Duodiode detector for warm-up time controlled, 600-ma heater strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



3AL5 (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Plate input (each section): p to k + h & i.s.	2.5	3.2	μμf
Cathode input (each section): k to p + h & i.s.	3.4	3.6	μμf
Plate to plate:			
p1 to p2 (all others grounded), max.	0.068	0.026	μμf
Cold resonant frequency (each unit, approx.)	700		mc

♦JETEC shield 316 connected to pin 6.

MAXIMUM RATINGS (Design center values)

Plate voltage, peak inverse	330	volts
Plate current, peak steady state (each plate)	54	ma
Output current, d-c (each plate)	9	ma

TYPICAL OPERATION

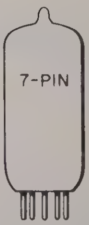
Half-Wave Rectifier*

Plate supply voltage, rms (each plate)	117	volts
Plate supply impedance, min. total effective (each plate)	300	ohms
Output current, d-c (each plate)	9.0	ma

NOTES:

*The two units may be used separately or in parallel.

CBS 3AU6



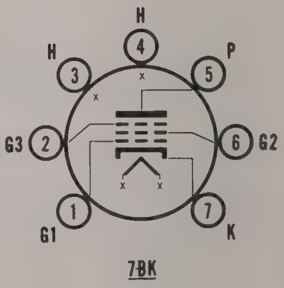
R-f amplifier, f-m limiter, & audio amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	0.0035	μμf
Input: g1 to k + h + g2 + g3 & i.s.	5.5	μμf
Output: p to k + h + g2 + g3 & i.s.	5.0	μμf

3AU6 (cont.)

MAXIMUM RATINGS (Design center values)

	Triode†	Pentode	
Plate voltage	250	300	volts
Grid 2 voltage	See Rating Chart in Appendix		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	3.2	3	watts
Grid 2 dissipation		0.65	watt

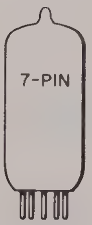
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Triode†	Pentode			
Plate supply voltage	250	100	250	250	volts
Grid 3 (suppressor)	connected to cathode at socket				
Grid 2 (screen) voltage		100	125	150	volts
Cathode bias resistor	330	150	100	68	ohms
Plate resistance (approx.)	.0075	0.5	1.5	1.0	meg
Transconductance	4800	3900	4500	5200	μmhos
Plate current	12.2	5.0	7.6	10.6	ma
Grid 2 current		2.1	3.0	4.3	ma
Grid 1 voltage (approx.) for $I_b = 10$ μa		−4.2	−5.5	−6.5	volts
Amplification factor	36				

†Grid 2 (screen) tied to plate.

CBS

3AV6



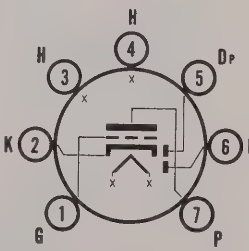
Detector, avc, and audio amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



7BT

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p	2.0	2.0	μμf
Input: g1 to k + h	2.2	2.2	μμf
Output: p to k + h	0.8	1.2	μμf
Plate (diode 2) to grid, max.	0.04	0.04	μμf

♦JETEC shield 316 connected to cathode

3AV6 (cont.)

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Diode voltage drop conducting 0.8 ma	10	volts
Control-grid voltage, positive d-c	0	volts
Plate dissipation	0.5	watt

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

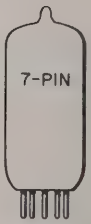
Plate voltage	100	250	volts
Control-grid voltage	−1	−2	volts
Plate resistance (approx.)	.08	.0625	meg
Transconductance	1250	1600	μmhos
Amplification factor	100	100	
Plate current	0.5	1.2	ma

3B7/1291

(See chart for seldom-used tubes)

CBS

3BA6



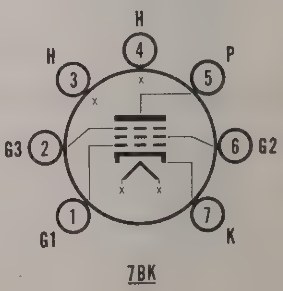
Pentode amplifier for r-f or i-f service, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



3BA6 (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p, max.	0.0035	0.0035	μμf
Input: g1 to k + h + g2 + g3	5.5	5.5	μμf
Output: p to k + h + g2 + g3	5.0	5.5	μμf

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	See Rating Chart in Appendix	
Grid 2 supply voltage	300	volts
Grid 1 voltage, negative d-c	50	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	3.0	watts
Grid 2 dissipation	0.6	watt

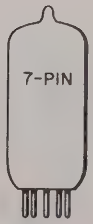
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	100	250	volts
Grid 3 (suppressor)	connected to cathode at socket		
Grid 2 (screen) voltage	100	100	volts
Cathode bias resistor	68	68	ohms
Plate resistance (approx.)	0.25	1.0	meg
Transconductance	4300	4400	μmhos
Plate current	10.8	11.0	ma
Grid 2 current	4.4	4.2	ma
Grid 1 voltage (approx.) for $g_m = 40$ μmhos	−20	−20	volts

CBS

3BC5



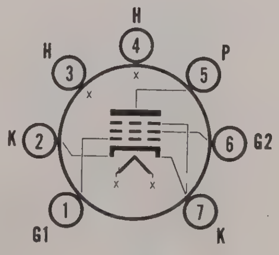
Pentode amplifier for r-f or i-f service, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



7BD

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Pentode connection	**No Shield**	**Shield♦**	
Grid to plate: g1 to p, max.	0.030	0.020	µµf
Input: g1 to k + h + g2 + g3 & i.s.	6.5	6.6	µµf
Output: p to k + h + g2 + g3 & i.s.	1.8	2.6	µµf

Triode connection (g2 tied to plate)			
Grid to plate: g1 to p + g2	2.5	2.5	µµf
Input: g1 to k + h + g3 & i.s.	3.9	4.0	µµf
Output: p + g2 to k + h + g3 & i.s.	3.0	4.3	µµf

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

	Triode*	**Pentode**	
Plate voltage	300	300	volts
Grid 2 voltage	Plate	See Rating Chart	
Grid 2 supply voltage	Plate	300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.5	2.0	watts
Grid 2 dissipation		0.5	watt

CHARACTERISTICS AND TYPICAL OPERATION

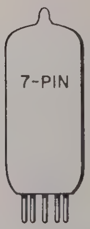
Class A Amplifier	**Triode***		**Pentode**			
Plate voltage	250	180	100	125	150	volts
Grid 2 (screen) voltage	Plate	Plate	100	125	150	volts
Cathode bias resistor	820	330	180	100	180	ohms
Plate resistance (approx.)	.009	.006	0.6	0.5	0.8	meg
Transconductance	4400	6000	4900	6100	5700	µmhos
Plate current	6.0†	8.0†	4.7	8.0	7.5	ma
Grid 2 current			1.4	2.4	2.1	ma
Grid 1 voltage (approx.) for $I_b = 10$ µa			−5.0	−6.0	−8.0	volts
Amplification factor	40	42				

NOTES:

*Grid 2 tied to plate.

†Total current flowing to plate and grid 2.

CBS 3BE6



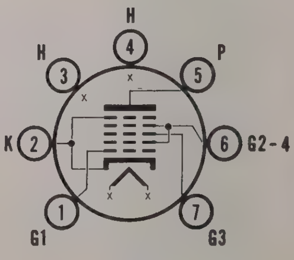
Radio-frequency converter for warm-up time controlled, 600-ma heater strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



7CH

3BE6 (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Shield♦	No Shield	
Signal grid to mixer plate: g3 to p, max.	0.25	0.30	μμf
R-f input: g3 to all others, max.	7.0	7.0	μμf
Mixer output: p to all others	13	8.0	μμf
Oscillator input: g1 to all others	5.5	5.5	μμf
Oscillator output: k and g5 to all except g1	20	15	μμf
Oscillator grid to cathode and grid 5: g1 to k and g5	3.0	3.0	μμf
Oscillator grid to mixer plate: g1 to p, max.	0.05	0.1	μμf
Oscillator grid to signal grid: g1 to g3, max.	0.15	0.15	μμf

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 and 4 voltage	100	volts
Grid 2 and 4 supply voltage	300	volts
Grid 3 voltage, negative d-c	50	volts
Grid 3 voltage, positive d-c	0	volts
Plate dissipation	1	watt
Grid 2 and 4 dissipation	1	watt
Cathode current, total	14	ma

CHARACTERISTICS AND TYPICAL OPERATION

Converter Service (Separate excitation)*

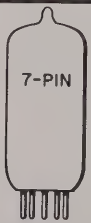
Plate voltage	100	250	volts
Grid 3 (signal grid) voltage	−1.5	−1.5	volts
Grid 2 and 4 (oscillator anode) voltage	100	100	volts
Grid 1 (oscillator grid) resistor	20,000	20,000	ohms
Grid 1 (oscillator grid) voltage, rms	10	10	volts
Plate resistance (approx.)	0.4	1.0	meg
Conversion transconductance	455	475	μmhos
Plate current	2.6	2.9	ma
Grid 2 and 4 (oscillator anode) current	7.0	6.8	ma
Grid 1 (oscillator grid) current	0.5	0.5	ma
Grid 3 voltage (approx.) for $g_c = 10$ μmhos	−30	−30	volts
Grid 3 voltage (approx.) for $g_c = 100$ μmhos	−6	−6	volts

Oscillator Characteristics, Not Oscillating

Plate voltage	100	volts
Grid 3 voltage	0	volts
Grid 2 and 4 (oscillator anode) voltage	100	volts
Grid 1 (oscillator grid) voltage	0	volts
Transconductance between grid 1 and grid 2	7250	μmhos
Amplification factor between grid 1 and grid 2	20	
Cathode current	25	ma
Grid 1 voltage (approx.) for $I_b = 10$ μa	−11	volts

*Values listed correspond closely to those for a self-excited oscillator circuit operating with zero bias.

CBS 3BN4

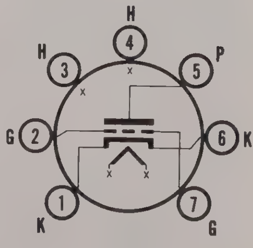


R-f amplifier in vhf television tuners, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	2.8	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode	100	volts
Warm-up time	11	secs. average

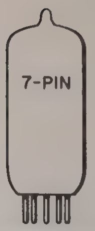
(See Series-String Heaters section of APPENDIX in CBS Tube Manual).



7EG

Type 3BN4 is identical to types 2BN4 and 6BN4 except for heater characteristics. See type 2BN4 for ratings and operating characteristics.

CBS 3BN6



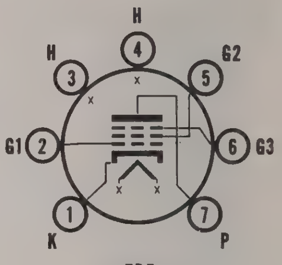
Gated-beam tube for service as f-m discriminator, limiter, and audio amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



7DF

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid 1 to all: g1 to k + h + g2 + g3 + p	4.2	µµf
Grid 3 to all: g3 to k + h + g1 + g2 + p	3.3	µµf
Grid 1 to grid 3: g1 to g3, max.	0.004	µµf

MAXIMUM RATINGS (Design center values)

Plate supply voltage	300	volts
Grid 2 voltage	100	volts
Grid 1 voltage, peak positive	55	volts
Cathode current, d-c	11.5	ma

CHARACTERISTICS AND TYPICAL OPERATION

Limiter-Discriminator Service*

Input signal center frequency	10.7	10.7	4.5	mc
Frequency deviation	±75	±75	±25	kc
Plate supply voltage	85	285	270	volts
Plate voltage	63	122	121	volts
Grid 2 (accelerator) voltage	55	100	100	volts
Cathode bias resistor†	200-400	200-400	200-400	ohms
Plate load resistor, R_L	.085	0.33	0.33	meg
Plate linearity resistor, R_d	470	1500	1000	ohms
Integrating capacitor, C_1	0.002	0.001	0.001	µf
Coupling capacitor, C_c	0.25	0.01	0.25	µf
Minimum signal voltage for limiting action, rms‡	1.25	1.25	1.25	volts
Plate current, d-c	0.25	0.49	0.44	ma
Grid 2 current	4.1	9.8	10.0	ma
Input signal level for a-m rejection adjustment†	1.25	2.0	2.0	volts
A-m rejection at E sig = 2.0 volts, rms	31	20	25	db
A-m rejection at E sig = 3.0 volts, rms	30	29	30	db
Total harmonic distortion	2.0	1.6	1.8	%
Peak audio output voltage	6.0	16.6	16.8	volts

NOTES:

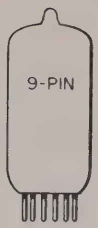
*See diagram in Basic Circuits section of Appendix.

†Adjust for maximum a-m rejection in the output of the limiter-discriminator stage at the specified signal level. A-m rejection is measured with an applied signal containing 30 percent amplitude modulation and 30 percent frequency modulation.

‡At signals above specified level, limiting is within ± 2 db.

CBS

3BU8



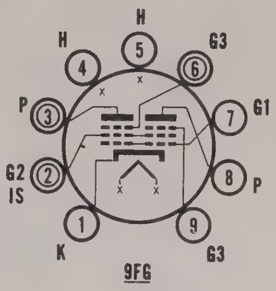
Combined sync and agc tube for television receivers, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual.)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid 3 to plate, each section	1.9	μμf
Grid 1 to all others	6.0	μμf
Grid 3 (each section) to all others	3.6	μμf
Plate (each section) to all others	3.0	μμf
Grid 3 (section 1) to grid 3 (section 2), max.	0.0015	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage*	300	volts
Grid 2 voltage	120	volts
Grid 3 voltage, positive d-c*	3.0	volt
Grid 3 voltage, negative d-c*	50	volts
Grid 3 voltage, peak positive*	50	volts
Grid 1 voltage, negative d-c	50	volts
Plate dissipation*	1.1	watts
Grid 2 dissipation	0.75	watt
Cathode current	12	ma
Grid 1 circuit resistance	0.5	meg
Grid 3 circuit resistance	0.5	meg

AVERAGE CHARACTERISTICS

Both Sections Operating

Plate voltage*	100	100	volts
Grid 2 (screen) voltage	67.5	67.5	volts
Grid 3 (suppressor) voltage*	—10	0	volts
Plate current*		2.2	ma
Grid 2 current	6.5	3.3	ma
Cathode current	6.6	7.8	ma

Each Section (Plate and Grid 3 of Opposite Section Grounded)

Plate voltage	100	100	volts
Grid 2 (screen) voltage	67.5	67.5	volts
Grid 3 (suppressor) voltage	0	0	volts
Grid 1 (control-grid) voltage	0	†	
Transconductance (grid 3)		180	μmhos
Transconductance (grid 1)	1500		μmhos
Plate current		2.2	ma
Grid 3 voltage when $I_b = 100\ \mu a$		—4.5	volts
Grid 1 voltage when $I_b = 100\ \mu a$		—2.3	volts

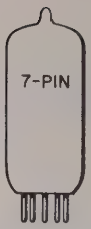
NOTES:

†With grid current adjusted for 100 μa, d-c.

*Each section.

CBS

3BY6



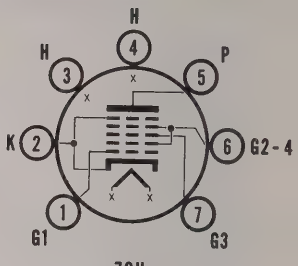
Gated amplifier for service as sync separator or clipper, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



7CH

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid 1 to plate: g1 to p	0.08	μμf
Grid 3 to plate: g3 to p	0.35	μμf
Grid 1 to all others: g1 to k + h + g2 + g3 + g4 + g5 + p	5.4	μμf
Grid 3 to all others: g3 to k + h + g1 + g2 & g4 + g5 + p	6.9	μμf
Plate to all others: p to k + h + g1 + g2 + g3 + g4 + g5	7.6	μμf
Grid 1 to grid 3: g1 to g3, max.	0.15	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 and 4 voltage	See Rating Chart in Appendix	
Grid 2 and 4 supply voltage	300	volts
Grid 3 voltage, negative d-c	50	volts
Grid 3 voltage, positive d-c	0	volts
Grid 3 voltage, peak positive	25	volts
Grid 1 voltage, negative d-c	100	volts
Plate dissipation	2.0	watts
Grid 2 and 4 dissipation	1.0	watt
Grid 3 input	0.1	watt
Grid 1 input	0.1	watt
Grid 3 circuit resistance		
With fixed bias	0.5	meg
With cathode bias	1.0	meg
Grid 1 circuit resistance		
With fixed bias	0.5	meg
With cathode bias	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

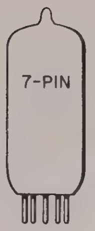
Plate voltage	250	250	250	volts
Grid 2 and 4 (screen) voltage	100	100	100	volts
Grid 3 voltage	0		—2.5	volts
Grid 1 voltage		—4.0	—2.5	volts
Grid 3 transconductance			500	μmhos
Grid 1 transconductance			1900	μmhos
Plate current			6.5	ma
Screen current			9.0	ma
Grid 3 voltage (approx.) for $I_b = 35$ μa		—15		volts
Grid 1 voltage (approx.) for $I_b = 35$ μa	—12			volts

Sync Separator and Sync Clipper

Plate voltage	25	25	10	volts
Grid 2 and 4 (screen) voltage	25	25	25	volts
Grid 3 voltage	0		0	volts
Grid 1 voltage		0	0	volts
Plate current			1.4	ma
Screen current			3.5	ma
Grid 3 voltage (approx.) for $I_b = 50$ μa		—2.5		volts
Grid 1 voltage (approx.) for $I_b = 50$ μa	—2.3			volts

CBS

3BZ6



Pentode i-f amplifier for gain-controlled stages, heater warm-up controlled for series strings

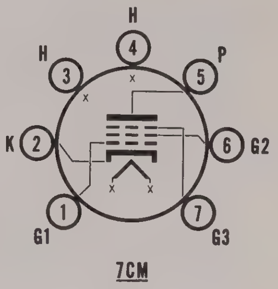
HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode†	300	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

†D-c component must not exceed 200 volts max.

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p, max.	0.025	0.015	$\mu\mu$f
Input: g1 to k + h + g2 + g3 & i.s.	7.0	7.0	$\mu\mu$f
Output: p to k + h + g2 + g3 & i.s.	2.0	3.0	$\mu\mu$f

♦JETEC shield 316 connected to cathode

MAXIMUM RATINGS (Design maximum values)

Plate voltage	330	volts
Grid 2 voltage	See Rating Chart in Appendix	
Grid 2 supply voltage	330	volts
Plate dissipation	2.3	watts
Grid 2 dissipation	0.55	watt
Grid 1 circuit resistance		
Fixed bias	0.25	meg
Self bias	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

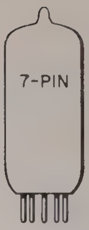
Plate voltage	125	volts
Grid 3 (suppressor)	connected to cathode at socket	
Grid 2 (screen) voltage	125	volts
Cathode bias resistor	56	ohms
Plate resistance (approx.)	0.26	meg
Transconductance	8000	μmhos
Plate current	14	ma
Grid 2 current	3.6	ma
Grid 1 voltage (approx.) for $g_m = 50$ μmhos	−19	volts
Transconductance ($E_{c1} = -4.5V$, $R_k = 0$)	700	μmhos

3C6

(See chart for seldom-used tubes)

CBS

3CB6



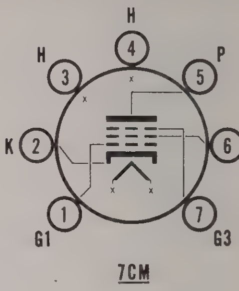
Pentode amplifier for r-f or i-f service, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	300	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield⧫	
Grid to plate: g1 to p, max.	0.025	0.15	μμf
Input: g1 to k + h + g2 + g3 & i.s.	6.5	6.5	μμf
Output: p to k + h + g2 + g3 & i.s.	2.0	3.0	μμf

⧫JETEC shield 316 connected to cathode

MAXIMUM RATINGS (Design maximum values)

Plate voltage	330	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	330	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	2.3	watts
Grid 2 dissipation	0.55	watt

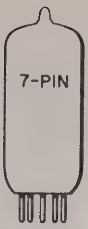
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	125	volts
Grid 3 (suppressor)	connected to cathode at socket	
Grid 2 (screen) voltage	125	volts
Cathode bias resistor	56	ohms
Plate resistance (approx.)	0.28	meg
Transconductance	8000	μmhos
Plate current	13	ma
Grid 2 current	3.7	ma
Grid 1 voltage (approx.) for $I_b = 20$ μa	−6.5	volts
Plate current at $E_{c1} = -3V$, $R_k = 0$	2.8	ma

CBS

3CE5



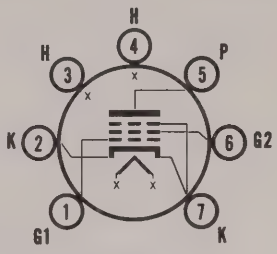
Controlled-cutoff pentode for r-f or i-f service, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 sec. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



7BD

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	0.030	μμf
Input: g1 to k + h + g2 + g3	6.5	μμf
Output: p to k + h + g2 + g3	1.9	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	150	volts
Plate dissipation	2.0	watts
Grid 2 dissipation	0.5	watt

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

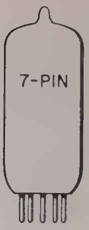
Plate voltage	125	volts
Grid 3 (suppressor)	connected to cathode at socket	
Grid 2 (screen) voltage	125	volts
Grid 1 (control-grid) supply voltage	−1	volts
Grid 1 resistor (bypassed)*	1.0	meg
Plate resistance (approx.)	0.3	meg
Transconductance	7600	μmhos
Plate current	11.0	ma
Grid 2 current	2.8	ma
Grid 1 voltage (approx.) for $I_b = 35$ μa	−5.0	volts

NOTE:

*Bypass of 1000 μf.

CBS

3CF6



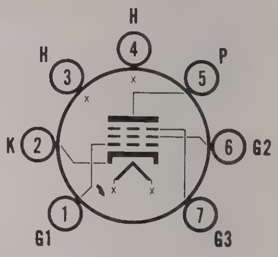
Controlled-cutoff pentode for r-f or i-f service, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	300	volts
Heater positive to cathode★	200	volts
Warm-up time	11 sec. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component 100 volts max.



7CM

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	0.020	μμf
Input: g1 to k + h + g2 + g3	6.3	μμf
Output: p to k + h + g2 + g3	1.9	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	150	volts
Plate dissipation	2.0	watts
Grid 2 dissipation	0.5	watt

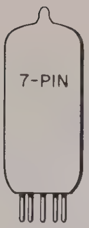
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	200	volts
Grid 3 (suppressor)	connected to cathode at socket	
Grid 2 (screen) voltage	150	volts
Cathode bias resistor	180	ohms
Plate resistance (approx.)	0.6	meg
Transconductance	6200	μmhos
Plate current	9.5	ma
Grid 2 current	2.8	ma
Grid 1 voltage (approx.) for $I_b = 35$ μa	−6.5	volts

CBS

3CS6



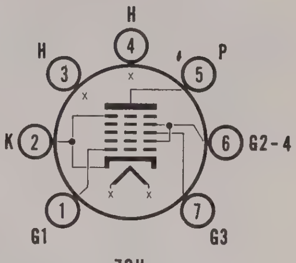
Heptode sync separator and clipper, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 sec. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



7CH

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid 3 to plate: g3 to p, max.	0.36	μμf
Grid 3 to all except plate	7.0	μμf
Output: p to all others	7.5	μμf
Grid 1 to plate: g1 to p, max.	0.07	μμf
Grid 1 to all except plate	5.5	μμf
Coupling: g1 to g3, max.	0.22	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 and 4 voltage	100	volts
Grid 2 and 4 supply voltage	300	volts
Plate dissipation	1.0	watt
Grid 2 and 4 dissipation	1.0	watt
Cathode current, total	14	ma
Grid 1 circuit resistance	0.47	meg
Grid 3 circuit resistance	2.2	meg

CHARACTERISTICS

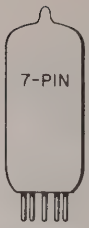
Plate voltage	10	100	100	volts
Grid 3 (signal grid 2) voltage	0	—1	0	volts
Grid 2 and 4 (screen) voltage	30	30	30	volts
Grid 1 (signal grid 1) voltage, rms	0	0	—1.0	volts
Plate resistance (approx.)		0.7	1.0	meg
Transconductance between grid 1 and plate			1100	μmhos
Transconductance between grid 3 and plate		1500		μmhos
Plate current	2.0	0.8	1.0	ma
Grid 2 and 4 (screen) current	4.5	5.5	1.3	ma
Grid 1 voltage (approx.) for $I_b = 50\ \mu a$			—2.5	volts
Grid 3 voltage (approx.) for $I_b = 50\ \mu a$		—2.2		volts

3D6

(See chart for seldom-used tubes)

CBS

3DT6



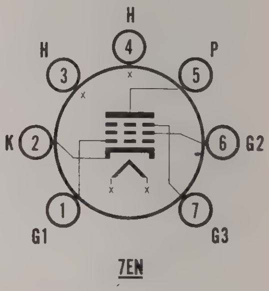
Dual controlled pentode for f-m detector and limiter, mixer, or gain-controlled amplifier use, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual.)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield♦

Grid 1 to plate: g1 to p	0.02	μμf
Grid 1 to grid 3: g1 to g3	0.1	μμf
Grid 3 to all others	6.1	μμf
Grid 1 to grid 2 + grid 3 + heater + cathode + i.s.	5.8	μμf
Grid 3 to plate	1.4	μμf

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

F-m Detector Service*

Plate voltage	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	300	volts
Grid 3 voltage	25	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	1.5	watts
Grid 2 dissipation (for grid 2 volts up to 150 volts)	1.0	watt
Grid 2 dissipation (for grid 2 volts between 150 and 300 volts)	See Rating Chart in APPENDIX	
Grid 1 circuit resistance		
Fixed bias	0.25	meg
Self bias	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate supply voltage	150	volts
Grid 3 (suppressor) supply voltage	connected to cathode at socket	
Grid 2 supply voltage	100	volts
Cathode bias resistor	560	ohms
Plate resistance (approx.)	0.15	meg
Transconductance		
Grid 1 to plate	800	μmhos
Grid 3 to plate	515	μmhos
Plate current	1.1	ma
Grid 2 current	2.1	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	—4.5	volts
Grid 3 voltage (approx.) for $I_b = 10\ \mu a$	—3.5	volts

3DT6 (cont.)

Locked-Oscillator, Quadrature Grid F-M Detector (Carrier Frequency of 4.5 Mc)*

Input Signal to Grid of Driver	15	200	500	mv rms
Plate supply voltage	250	250	250	volts
Grid 3 voltage (from 0.56 meg resistor)	−5	−6	−6.4	volts
Grid 2 supply voltage	100	100	100	volts
Cathode-bias resistor	560	560	560	ohms
Plate load resistor	0.27	0.27	0.27	meg
Plate current	0.23	0.22	0.21	ma
Grid 2 current	3.4	5.5	6.0	ma
Grid 1 current	0.013	0.6	0.8	ma
Bandwidth (10% total harmonic distortion)	65	120	118	kc
A-m rejection (approx.)†	33	29	28	db
Audio output voltage, rms (approx.)				
With ±7.5 kc deviation from mean value of 4.5 Mc	5.5	6.5	7.5	volts
With a ±25 kc deviation from mean value of 4.5 Mc	17	21	23	volts
Total harmonic distortion				
With a ±25 kc deviation from mean value of 4.5 Mc	2	3	4	%
Sensitivity				
With a ±7.5 kc deviation from mean value of 4.5 Mc			5	mv▲
With a ±25 kc deviation from mean value of 4.5 Mc			15	mv▲

NOTES:

*See diagram of typical circuit in Circuits section of APPENDIX.

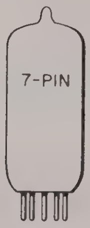
†Ratio of audio output voltage produced by 30% amplitude modulation of the 4.5 Mc carrier frequency to the audio output produced by a ±25 Kc deviation from the 4.5 Mc carrier frequency with a modulating frequency of 400 cps in both cases.

▲Signal level at which detector circuit will handle the indicated deviation in frequency from the mean value of 4.5 Mc before distortion occurs.

3E5 • 3E6 • 3LE4 • 3LF4

(See chart for seldom-used tubes)

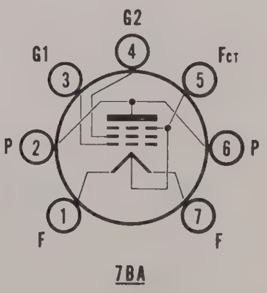
CBS 3Q4



Audio power amplifier for battery-powered receivers

FILAMENT CHARACTERISTICS

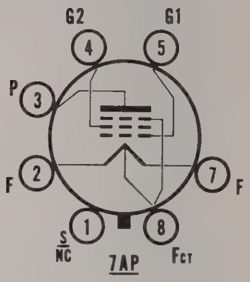
	Series	Parallel	
Voltage, d-c	2.8	1.4	volts
Current	50	100	ma



Type 3Q4 is identical to type 3V4 except for a different basing diagram. For an explanation of series/parallel filament connections see the notes for type 3V4.

CBS 3Q5GT

Audio power amplifier for use in portable battery-powered receivers



FILAMENT CHARACTERISTICS

	Series	Parallel*	
Voltage, d-c	2.8	1.4	volts
Current	50	100	ma

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.6	μμf
Input: g1 to f (center-tap) + b.p. + g2	8.0	μμf
Output: p to f (center-tap) + b.p. + g2	6.5	μμf

MAXIMUM RATINGS (Design center values)

	Series Filament	Parallel Filament	
Plate voltage	110	110	volts
Grid 2 voltage	110	110	volts
Cathode current, zero signal	6	12	ma
Grid circuit resistance	1.0	1.0	meg

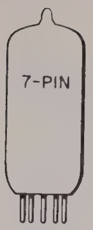
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Series Filament		Parallel Filament			
Plate voltage	90	110	85	90	110	volts
Grid 2 (screen) voltage	90	110	85	90	110	volts
Grid 1 (control-grid) voltage	−4.5	−6.6	−5.0	−4.5	−6.6	volts
Plate resistance (approx.)	0.08	0.11	0.07	0.09	0.1	meg
Transconductance	2000	2000	1950	2200	2200	μmhos
Grid 1 input voltage, peak a-f	4.5	5.1	5.0	4.5	5.4	volts
Plate current	8.0	8.5	7.0	9.5	10.0	ma
Grid 2 current, zero signal	1.0	1.1	0.8	1.3	1.4	ma
Load resistance impedance	8000	8000	9000	8000	8000	ohms
Total harmonic distortion (approx.)	8.5	8.5	5.5	6.0	6.0	%
Power output, maximum signal	230	330	250	270	400	mw

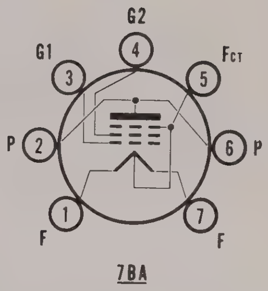
NOTE:

*For parallel filament connection tie pins 2 and 7. Pin 8 connects to negative potential.

CBS 3S4



Audio power amplifier for use in portable battery-powered receivers



FILAMENT CHARACTERISTICS

	Series	Parallel*	
Voltage, d-c	2.8	1.4	volts
Current	50	100	ma

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.3	μμf
Input: g1 to f (center-tap) + g3 + g2	4.8	μμf
Output: p to f (center-tap) + g3 + g2	4.0	μμf

MAXIMUM RATINGS (Design center values)

	Series Filament	Parallel Filament	
Plate voltage	90	90	volts
Grid 2 voltage	67.5	67.5	volts
Cathode current, zero signal	4.5	9.0	ma
Cathode current, maximum signal	6.0	12.0	ma
Grid 1 circuit resistance			
Fixed bias	2.2		meg
Self bias	2.2		meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Series Filament		Parallel Filament		
Plate voltage	67.5	90	67.5	90	volts
Grid 2 (screen) voltage	67.5	67.5	67.5	67.5	volts
Grid 1 (control-grid) voltage	—7	—7	—7	—7	volts
Plate resistance (approx.)	0.1	0.1	0.1	0.1	meg
Transconductance	1400	1425	1550	1575	μmhos
Grid 1 input voltage, peak a-f	7	7	7	7	volts
Plate current, zero signal	6.0	6.1	7.2	7.4	ma
Grid 2 current, zero signal	1.2	1.1	1.5	1.4	ma
Load resistance impedance	5000	8000	5000	8000	ohms
Total harmonic distortion (approx.)	12	13	10	12	%
Power output, maximum signal	160	235	180	270	mw

Typical Operation with Single Filament Section

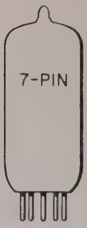
Plate voltage	90	volts
Grid 2 (screen) voltage	67.5	volts
Grid 1 (control-grid) voltage	—7	volts
Plate resistance (approx.)	0.2	meg
Transconductance	800	μmhos
Grid 1 input voltage, peak a-f	7	volts
Plate current, zero signal	3.7	ma
Grid 2 current, zero signal	0.7	ma
Load resistance	16,000	ohms
Total harmonic distortion (approx.)	12	%
Power output, maximum signal	145	mw

NOTE:

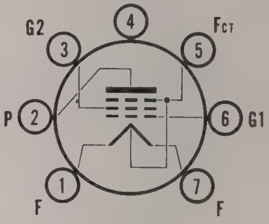
*For parallel filament connection tie pins 1 and 7. Pin 5 connects to negative potential.

CBS

3V4



Audio power amplifier for use in battery-powered receivers



6BX

HEATER CHARACTERISTICS

	Series	Parallel*	
Voltage, d-c	2.8	1.4	volts
Current	50	100	ma

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.20	μμf
Input: g1 to f (center-tap) + g3 + g2	5.5	μμf
Output: p to f (center-tap) + g3 + g2	3.8	μμf

MAXIMUM RATINGS (Design center values)

	Series Filament	Parallel Filament	
Plate voltage	90	90	volts
Grid 2 voltage	90	90	volts
Grid 2 supply voltage	—4.5	—5.0	volts
Cathode current, maximum signal	6	12	ma
Cathode current, zero signal	6	12	ma
Grid circuit resistance			
Fixed bias	2.2		meg
Self bias	2.2		meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

	Series	Parallel		
Plate voltage	90	85	90	volts
Grid 2 (screen) voltage	90	85	90	volts
Grid 1 (control-grid) voltage	—4.5	—5.0	—4.5	volts
Plate resistance (approx.)	0.12	0.12	0.10	meg
Transconductance	2000	1975	2150	μmhos
Grid 1 input voltage, peak a-f	4.5	5.0	4.5	volts
Plate current, zero signal	7.7	6.9	9.5	ma
Grid 2 current, zero signal	1.7	1.5	2.1	ma
Load resistance impedance	10,000	10,000	10,000	ohms
Total harmonic distortion (approx.)	7	10	7	%
Power output, maximum signal	0.24	0.25	0.27	mw

Typical Operation with Single Filament Section

Plate voltage	90	volts
Grid 2 (screen) voltage	90	volts
Grid 1 (control-grid) voltage	—4.5	volts
Plate resistance	0.2	meg
Transconductance	1100	μmhos
Grid-to-grid input voltage, peak a-f	4.5	volts
Plate current, zero signal	4.8	ma
Grid 2 current, zero signal	1.1	ma
Load resistance	20,000	ohms
Total harmonic distortion (approx.)	7	%
Power output, maximum signal	135	mw

NOTE:

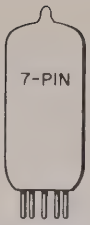
*For parallel connection tie pins 1 and 7. Connect pin 5 to negative potential.

4A6G

(See chart for seldom-used tubes)

CBS

4AU6



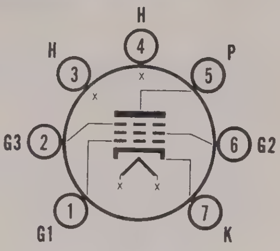
R-f amplifier, heater warm-up controlled

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.2	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater neg. to cathode	200	volts
Heater pos. to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.

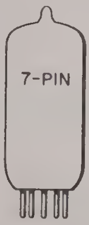


7BK

Type 4AU6 is identical to types 3AU6, 6AU6 and 12AU6 except for heater characteristics. See type 3AU6 for ratings and operating characteristics.

CBS

4BA6



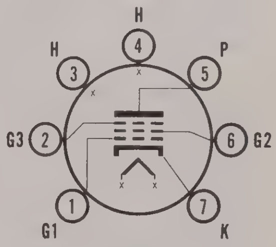
Pentode amplifier for gain controlled r-f or i-f stages, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.2	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater neg. to cathode	200	volts
Heater pos. to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.

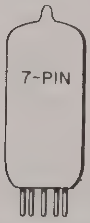


7CC

Type 4BA6 is identical to types 3BA6, 6BA6 and 12BA6 except for heater characteristics. See type 3BA6 for ratings and operating characteristics.

CBS

4BC5



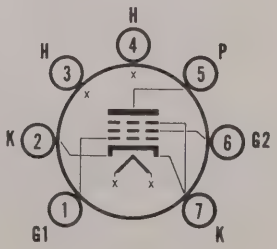
R-f amplifier, heater warm-up controlled

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.2	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater neg. to cathode	200	volts
Heater pos. to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

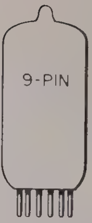
★D-c component must not exceed 100 volts max.



7BD

Type 4BC5 is identical to types 3BC5 and 6BC5 except for heater characteristics. See type 3BC5 for ratings and operating characteristics.

CBS 4BC8



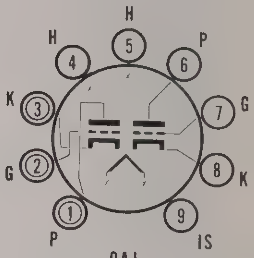
Gain controlled vhf cascode amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.2	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode*	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 sec. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



9AJ

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield♦

	Section 1†		Section 2†	
Grid to plate: g1 to p	1.4		1.4	μμf
Input: g1 to k + h	2.5		2.5	μμf
Output: p to k + h	1.3		1.3	μμf
Heater to cathode: h to k	2.3		2.3	μμf
Coupling: p1 to p2		0.015		μμf
Coupling: g1 to g2		0.007		μμf

♦JETEC shield 315 connected to cathode.

†Section 1 connects to pins 6, 7, and 8.

MAXIMUM RATINGS (Design center values)▲

Plate voltage*	250	volts
Plate dissipation	2	watts
Cathode current	20	ma
Control-grid circuit resistance	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier▲

Plate voltage	150	volts
Control-grid voltage	0	volts
Cathode-bias resistor	220	ohms
Transconductance	6200	μmhos
Amplification factor	35	
Plate current	10	ma
Control-grid voltage (approx.) for gm = 50 μmhos	−13	volts

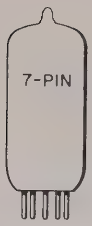
NOTES:

▲Each section.

*This rating may be as high as 300 volts maximum under cutoff conditions when the tube is used as a cascode amplifier and the two sections are connected in series.

CBS

4BE6



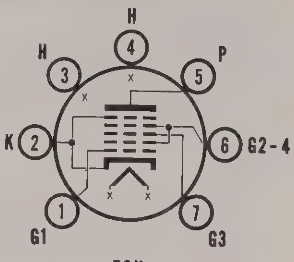
Radio-frequency converter, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.2	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.

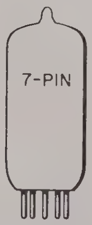


7CH

Type 4BE6 is identical to types 3BE6 and 6BE6 except for heater characteristics. See type 3BE6 for ratings and operating characteristics.

CBS

4BN6



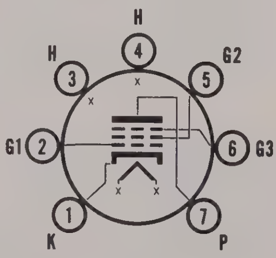
Gated beam tube for f-m discriminator, limiter, and audio amplifier service, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.2	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.

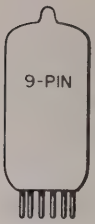


7DF

Type 4BN6 is identical to types 3BN6 and 6BN6 except for heater characteristics. See type 3BN6 for ratings and operating characteristics.

CBS

4BQ7A



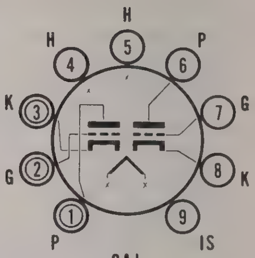
High-gain, low-noise vhf cascode amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.2	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode*	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 sec. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



9AJ

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield♦

	Section 1†		Section 2†	
Grid to plate: g1 to p	1.15		1.15	μμf
Input: g1 to k + h + i.s.	2.85			μμf
Output: p to k + h + i.s.	1.35			μμf
Plate to cathode: p to k, max.	0.15		0.15	μμf
Heater to cathode: h to k	2.65		2.70	μμf
Coupling: p1 to p2, max.		0.010		μμf
Coupling: p2 to p1 and g1, max.		0.024		μμf
Grounded grid operation				
Input: k to h + g + i.s.			4.95	μμf
Output: p to h + g + i.s.			2.27	μμf

♦JETEC shield 315 connected to cathode.

†Section 1 connects to pins 6, 7, and 8.

MAXIMUM RATINGS (Design center values)▲

Plate voltage*	250	volts
Plate dissipation	2	watts
Cathode current	20	ma
Control-grid circuit resistance	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier▲

Plate voltage*	150	volts
Cathode-bias resistor	220	ohms
Plate resistance (approx.)	6100	ohms
Transconductance	6400	μmhos
Amplification factor	39	
Plate current	9	ma
Control-grid voltage (approx.) for $I_b = 10\ \mu a$	−10	volts

Direct Coupled R-F Grounded Grid Operation♠

	Section 1†	Section 2†	
Plate supply voltage	250	250	volts
Plate voltage	135	115	volts
Control-grid voltage	−1.0		volts
Cathode-bias resistor	100		ohms
Grid resistor		0.5	meg
Plate current	10	10	ma
Control-grid current	0	0	ma
Control-grid voltage (approx.) for $I_b = 10\ \mu a$	−14		volts
Heater-cathode voltage			
Heater negative to cathode	1	125	volts

NOTES:

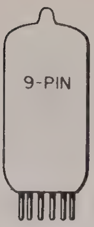
*Under cutoff conditions, in r-f grounded grid circuits with direct coupled drive, this voltage may be as high as 300 volts.

†Section 1 connects to pins 6, 7, and 8. Section 2 connects to pins 1, 2, and 3.

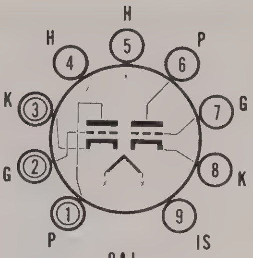
▲Each section.

♠Section 1 (driver) is directly coupled to Section 2 (driven grounded-grid amplifier).

CBS 4BS8



Low-noise vhf cascode amplifier, heater warm-up controlled for series strings



9AJ

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.2	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield⧫

	Section 1†	Section 2†	
Grid to plate: g1 to p	1.15	1.15	μμf
Input: g1 to k + h + i.s.	2.60		μμf
Output: p to k + h + i.s.	1.35		μμf
Plate to cathode: p to k	0.15	0.15 max.	μμf
Heater to cathode: h to k	2.60	2.70	μμf
Plate (Sect. 1) to plate (Sect. 2)	0.010 max.		μμf
Plate (Sect. 2) to plate and grid (Sect. 1)	0.024 max.		μμf
Grounded grid operation			
Input	4.95		μμf
Output	2.27		μμf

⧫JETEC shield 315 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	150	volts
Plate dissipation	2.0	watts
Cathode current	20	ma
Control-grid circuit resistance*	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	150	volts
Cathode-bias resistor	220	ohms
Plate resistance (approx.)	5000	ohms
Transconductance	7200	μmhos
Amplification factor	36	
Plate current	10	ma
Control-grid voltage (approx.) for $I_b = 10\ \mu a$‡	7	volts

Cascode Operation

Plate supply voltage	250	volts
Control-grid voltage	—1.0	volt
Transconductance	10,000	μmhos
Plate current	16	ma
Control-grid voltage (approx.) for $I_b = 10\ \mu a$	6.0	volts

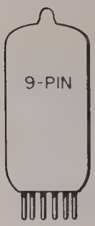
NOTES:

*Each unit. ‡Section 2 only.

†Section 1 connects to pins 6, 7, and 8. Section 2 connects to pins 1, 2, and 3.

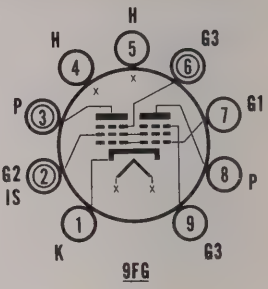
CBS

4BU8



Combined sync and agc tube for television receivers, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS



Voltage, a-c or d-c	4.2	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

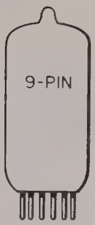
(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.

Type 4BU8 is identical to types 3BU8 and 6BU8 except for heater characteristics. See type 3BU8 for ratings and operating characteristics.

CBS

4BX8



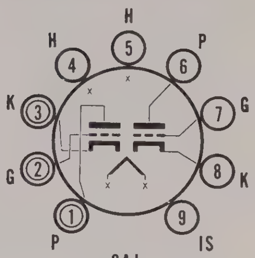
Vhf cascode amplifier in TV receivers having low supply voltages, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.5	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



9AJ

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield♦

	Section 1	Section 2	
Grid to plate: g1 to p	1.4	1.4	µµf
Plate to cathode: p to k	.165	.165	µµf
Input: g to h + k + i.s.		2.4	µµf
Input: k to h + g + i.s.♦♦	4.9		µµf
Output: p to k + h + i.s.		1.25	µµf
Output: p to h + g + i.s.♦♦	2.6		µµf

♦JETEC shield 315 connected to pin 9.

♦♦Read as grounded grid amplifier.

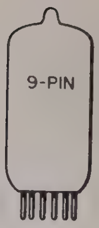
MAXIMUM RATINGS (Design maximum values)

Plate voltage	150	volts
Plate dissipation (each plate)	2.0	watts
Cathode current	20	ma
Control-grid circuit resistance	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

	Cascode Amplifier	Class A Amplifier	
Plate voltage		65	volts
Plate supply voltage	125		volts
Control-grid voltage	−0.5	−1.0	volts
Transconductance	7500		µmhos
Amplification factor		25	
Plate current	11.0	9.0	ma
Control-grid voltage (approx.) for $I_b = 10$ µa		−7.0	volts

CBS 4BZ7



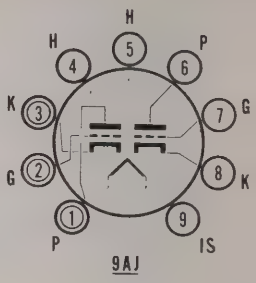
High-gain, low-noise cascode amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.2	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode*	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 sec. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield♦

	Section 1†		Section 2†	
Grid to plate: g1 to p	1.2		1.2	μμf
Input: g1 to k + h + i.s.	2.6			μμf
Output: p to k + h + i.s.	1.2			μμf
Plate to cathode: p to k	0.12		0.12	μμf
Heater to cathode: h to k	2.6		2.7	μμf
Coupling: p1 to p2		0.010		μμf
Coupling: p2 to p1 + g1, max		0.024		μμf
Grounded grid operation				
Input: k to h + g + i.s.			5.0	μμf
Output: p to h + g + i.s.			2.2	μμf

♦JETEC shield 315 connected to cathode.

†Section 1 connects to pins 6, 7, and 8.

MAXIMUM RATINGS (Design center values)▲

Plate voltage*	250	volts
Plate dissipation	2	watts
Cathode current	20	ma
Control-grid circuit resistance	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier▲

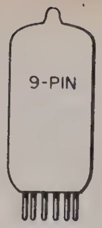
Plate voltage	150	volts
Cathode-bias resistor	220	ohms
Plate resistance (approx.)	5300	ohms
Transconductance	6800	μmhos
Amplification factor	36	
Plate current	10	ma
Control-grid voltage (approx.) for $I_b = 100\ \mu a$	−7	volts

NOTE:

▲Each section.

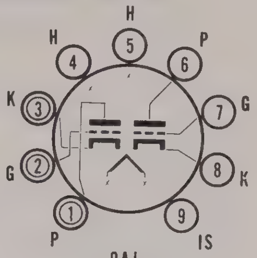
*Under cut-off conditions, in r f grounded circuits with direct coupled drive, the voltage may be as high as 300 volts.

CBS 4BZ8



Gain-controlled low-noise vhf cascode amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS



9AJ

Voltage, a-c or d-c	4.2	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield♦

	Section 1†	Section 2†	
Grid to plate: g1 to p	1.15		μμf
Output: p to k + h		0.15	μμf
Plate (Sect. 1) to plate (Sect. 2)	0.10		μμf

♦JETEC shield 315 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	250	volts
Plate dissipation	2.2	watts
Cathode current	20	ma
Control-grid circuit resistance	0.1	meg

CHARACTERISTICS AND TYPICAL OPERATION

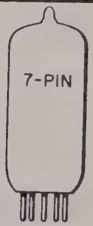
Class A Amplifier (Each Section)

Plate voltage	125	volts
Cathode-bias resistor	100	ohms
Plate resistance (approx.)	5600	ohms
Transconductance	8000	μmhos
Transconductance, cascode ($E_b = 250V$, $E_{c1} = -0.5V$)	10,000	μmhos
Amplification factor	45	
Plate current	10	ma
Cascode plate current ($E_b = 250V$, $E_{c1} = -0.5V$)	15	ma
Control-grid voltage (approx.) for gm = 50 μmhos	−13	volts

NOTES:

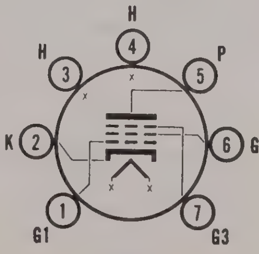
†Section 1 connects to pins 6, 7, and 8. Section 2 connects to pins 1, 2, and 3.

CBS 4CB6



Pentode amplifier for r-f or i-f service, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS



7CM

Voltage, a-c or d-c	4.2	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	300	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

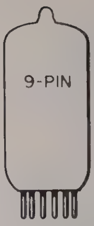
(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.

Type 4CB6 is identical to types 3CB6 and 6CB6 except for heater characteristics. See type 3CB6 for ratings and operating characteristics.

CBS

4CX7



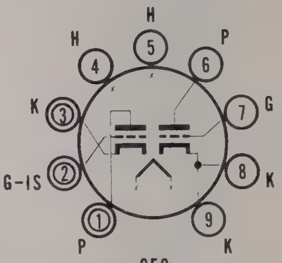
Low-noise vhf cascode amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.2	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode†	200	volts
Heater positive to cathode★	200	volts

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



9FC

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield♦

	Section 1‡	Section 2‡	
Grid to plate: g1 to p	1.2		μμf
Input: g1 to k + h	2.4		μμf
Output: p to k + h	1.3		μμf
Heater to cathode: h to k▲	2.4	2.2	μμf
Plate to cathode: p to k, max.	0.17	0.17	μμf
Plate (Sect. 2) to plate and grid (Sect. 1), max.	0.27		μμf
Plate (Sect. 1) to plate (Sect. 2), max.	0.17		μμf
Grounded grid operation			
Input: k to g + h + i.s.		4.2	μμf
Output: p to g + h + i.s.		1.7	μμf

♦JETEC shield 315 connected to heater unless otherwise specified.

▲JETEC shield 315 connected to ground.

MAXIMUM RATINGS (Design center values) (Each section)

Plate voltage†	250	volts
Plate dissipation	2.0	watts
Cathode current	20	ma
Control-grid circuit resistance	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier (Each section)

Plate voltage	150	volts
Control-grid voltage	0	volts
Cathode-bias resistor	220	ohms
Transconductance	6400	μmhos
Amplification factor	39	
Plate current	9.0	ma
Control-grid voltage (approx.) for $I_b = 10$ μa	−10	volts

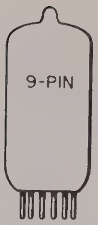
NOTES:

†Under cutoff conditions when the tube is used as a cascode amplifier, this rating may be as high as 300 volts maximum.

‡Section 1 connects to pins 6, 7, 8, and 9. Section 2 connects to pins 1, 2, and 3.

CBS

5AM8



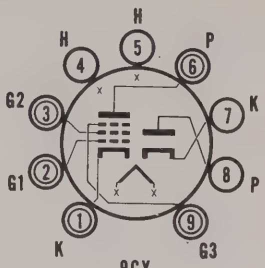
High-gain i-f amplifier and video detector, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 sec. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component 100 volts max.



9CY

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Pentode	**No Shield**	**Shield♦**	
Grid to plate: g1 to p, max.	0.015	0.015	μμf
Input: g1 to k + h + g2 + g3	6.0	6.0	μμf
Output: p to k + h + g2 + g3	2.6	3.4	μμf
Diode			
Input: p to k + h	1.7	2.3	μμf
Cathode to heater and plate: k to h + p	3.0	3.0	μμf
Coupling: diode plate to pentode plate	0.10	0.035	μμf
Coupling: diode plate to pentode grid 1	0.006	0.005	μμf
Coupling: diode cathode to pentode plate	0.15	0.15	μμf

♦JETEC shield 315 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	300	volts
Grid 1 voltage, positive d-c	0	volts
Grid 3 voltage	0	volts
Plate dissipation	2.8	watts
Grid 2 dissipation	0.5	watt
Grid 1 circuit resistance		
Fixed bias	0.25	meg
Cathode bias	1.0	meg
Diode current for continuous operation	5.0	ma

CHARACTERISTICS AND TYPICAL OPERATION

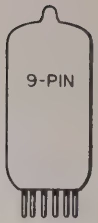
Class A Amplifier

Plate voltage	200	volts
Grid 3 (suppressor) voltage	0	volts
Grid 2 (screen) voltage	150	volts
Cathode bias resistor	120	ohms
Plate resistance (approx.)	0.6	meg
Transconductance	7000	μmhos
Plate current	11.5	ma
Grid 2 current	2.7	ma
Grid 1 voltage (approx.) for $I_b = 10\mu a$	−8	volts
Diode plate voltage for diode current = 50 ma*	10	volts

NOTE:

*Test conditions only—Operating conditions must not exceed the design center rating.

CBS 5AN8



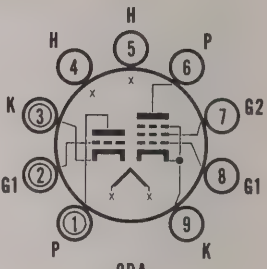
Sync clipper, sync separator, etc. and i-f or video amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage max.		
Heater negative to cathode	200	volts
Heater positive to cathode	200	volts
Warm-up time	11 sec. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



9DA

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

Grid to plate: g1 to p	1.5	μμf
Input: g1 to k + h	2.0	μμf
Output: p to k + h	0.27	μμf

Pentode Section

Grid to plate: g1 to p, max.	0.04	μμf
Input: g1 to k + h + g2 + g3	7.0	μμf
Output: p to k + h + g2 + g3	2.3	μμf
Coupling: pentode grid 1 to triode plate	0.006	μμf
Coupling: pentode plate to triode grid	0.005	μμf
Coupling: pentode plate to triode plate	0.045	μμf

MAXIMUM RATINGS (Design center values)

	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.6	2.0	watts
Grid 2 dissipation		0.5	watt
Grid 1 circuit resistance*			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

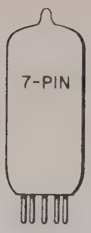
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Triode	Pentode	
Plate supply voltage	200	200	volts
Grid 2 (screen) supply voltage		150	volts
Grid 1 (control-grid) voltage	−6		volts
Cathode-bias resistor		180	ohms
Plate resistance (approx.)	.00575	0.30	meg
Transconductance	3300	6200	μmhos
Amplification factor	19		
Plate current	13	9.5	ma
Grid 2 current		2.8	ma
Grid 1 voltage (approx.) for $I_b = 10\mu a$	−19	−8	volts

NOTE:

*If either unit is operating at maximum rated conditions, Grid 1 circuit resistance for both units should not exceed the values given.

5AQ5



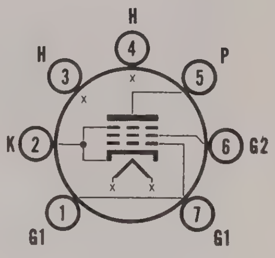
Audio power amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	sec. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



7BZ

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.4	μμf
Input: g1 to k + h + g2 + b.p.	8.0	μμf
Output: p to k + h + g2 + b.p.	8.5	μμf

MAXIMUM RATINGS (Design center values unless noted)

	Class A Amplifier	Vertical Deflection Amplifier *Triode Connected†	
Plate voltage	250	250	volts
Plate voltage, peak positive pulse (absolute max.)		1100	volts
Grid 2 voltage	250		volts
Grid voltage, peak negative		250	volts
Plate dissipation	12	9▲	watts
Grid 2 dissipation	2		watts
Grid 1 circuit resistance			
Fixed bias	0.1		meg
Self bias	0.5	2.2	meg
Bulb temperature at hottest point	250	250	°C

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	180	250	volts
Grid 2 (screen) voltage	180	250	volts
Grid 1 (control-grid) voltage	−8.5	−12.5	volts
Plate resistance (approx.)	58,000	52,000	ohms
Transconductance	3700	4100	μmhos
Grid 1 input voltage, peak a-f	8.5	12.5	volts
Plate current, zero signal	29	45	ma
Plate current, maximum signal	30	47	ma
Grid 2 current, zero signal	3.0	4.5	ma
Grid 2 current, maximum signal	4.0	7.0	ma
Load resistance impedance	5500	5000	ohms
Total harmonic distortion (approx.)	8	8	%
Power output, maximum signal	2.0	4.5	watts

5AQ5 (cont.)

Class AB Amplifier (Two tube values unless noted)

Plate voltage	250	volts
Grid 2 (screen) voltage	250	volts
Grid 1 (control-grid) voltage	—15	volts
Plate resistance, per tube	60,000	ohms
Transconductance, per tube	3750	μmhos
Grid-to-grid input voltage, peak a-f	30	volts
Plate current, zero signal	70	ma
Plate current, maximum signal	79	ma
Grid 2 current, zero signal	5	ma
Grid 2 current, maximum signal	13	ma
Load resistance, plate-to-plate	10,000	ohms
Total harmonic distortion (approx.)	5	%
Power output, maximum signal	10	watts

Triode Connected

Plate and grid 2 voltage (p + g2 tied together)	250	volts
Grid 1 voltage	—12.5	volts
Plate resistance (approx.)	1970	ohms
Amplification factor	9.5	
Transconductance	4800	μmhos
Plate current	49.5	ma
Grid 1 voltage (approx.) for $I_b = 0.5$ ma	37	volts

NOTES:

*Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

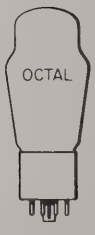
†With screen tied to plate.

▲Tube protection is needed for no-drive conditions if grid resistor bias is used.

CBS

5AS4

5AS4A

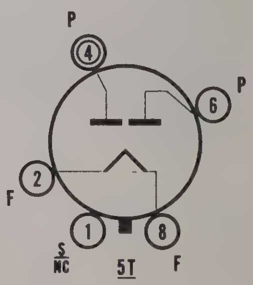


High-vacuum full-wave power rectifier with high d-c current output

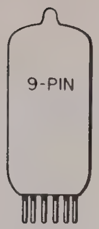
FILAMENT CHARACTERISTICS

Voltage, a-c	5.0	volts
Current	3.0	amp

Types 5AS4 and 5AS4A are identical to type 5U4GB except for type of glass envelope and type of octal base.

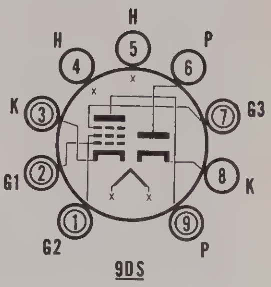


CBS 5AS8



Detector—video, i-f, or agc amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS



Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 sec. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Pentode

Grid to plate: g1 to p, max.	0.02	μμf
Input: g1 to k + h + g2 + g3	7.0	μμf
Output: p to k + h + g2 + g3	2.2	μμf
Pentode grid to diode plate, max.	0.005	μμf
Pentode plate to diode cathode, max.	0.15	μμf
Pentode plate to diode plate, max.	0.10	μμf

Diode

Output: p to k + h + i.s.	3.0	μμf

MAXIMUM RATINGS (Design center values)

Pentode Unit

Plate voltage	300	volts
Grid 3 (suppressor) voltage	0	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	300	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	2.5	watts
Grid 2 dissipation	0.5	watt
Grid 1 circuit resistance		
Fixed bias	0.25	meg
Self bias	1.0	meg

Diode Unit

Peak inverse plate voltage	330	volts
Peak plate current	50	ma
D-c plate current	5	ma

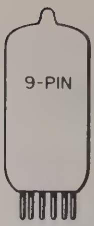
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate supply voltage	200	volts
Grid 3 (suppressor)	connected to cathode at socket	
Grid 2 supply voltage	150	volts
Cathode bias resistor	180	ohms
Plate resistance (approx.)	0.3	meg
Transconductance	6200	μmhos
Plate current	9.5	ma
Grid 2 current	3.0	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−8.0	volts

CBS

5AT8

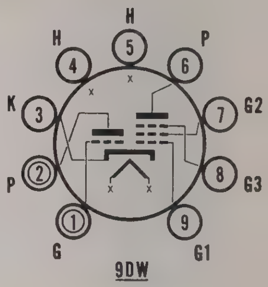


Vhf oscillator and mixer, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c........... 4.7 volts
Current..................... 600 ma
Peak heater-cathode voltage, max.
  Heater negative to cathode................ 100 volts
  Heater positive to cathode★.............. 100 volts
Warm-up time........ 11 sec. average
  (See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

	Shield⧫	No Shield	
Grid to plate: g1 to p	1.5	1.5	μμf
Input: g1 to k + h	2.4	2.0	μμf
Output: p to k + h	1.0	0.5	μμf

Pentode Section

	Shield⧫	No Shield	
Grid to plate: g1 to p, max.	0.016	0.025	μμf
Input: g1 to k + h + g2 + g3	4.7	4.5	μμf
Output: p to k + h + g2 + g3	1.6	0.9	μμf
Coupling: pentode grid 1 to triode plate	0.04	0.05	μμf
Coupling: heater to cathode	6.5*	6.5	μμf
Coupling: pentode plate to triode plate	0.007	0.05	μμf

Pentode connected as triode▲

	Shield⧫	No Shield	
Grid 1 to plate: g1 to p	1.3	1.3	μμf
Input: g1 to k + h	3.3	3.0	μμf
Output: p to k + h	2.5	1.7	μμf

⧫JETEC shield 315 connected to cathode.

*JETEC shield 315 connected to ground.

▲Grid 3 connected to cathode, and grid 2 connected to plate.

MAXIMUM RATINGS (Design center values)

Converter Service	Pentode as Triode Mixer†	Triode Osc.	Pentode Mixer	
Plate voltage	250	250	250	volts
Grid 3 voltage			0	volts
Grid 2 voltage	See Rating Chart in APPENDIX			
Grid 2 supply voltage			250	volts
Grid 1 voltage, positive d-c	0	0	0	volts
Grid 1 voltage, negative d-c	40	40	40	volts
Plate dissipation	2.4	1.5	2.0	watts
Grid 2 dissipation			0.4	watt
Grid 1 dissipation		0.5		watt
Cathode current				ma
Grid 1 circuit resistance				
Fixed bias		0.1	0.1	meg
Self bias		0.5	0.5	meg

CHARACTERISTICS Class A Amplifier	Pentode Triode Connected	Triode	Pentode	
Plate voltage	150	100	250	volts
Grid 3 (suppressor)	connected to cathode at socket		connected to cathode at socket	
Grid 2 (screen) voltage	tied to plate		150	volts
Cathode-bias resistor	250	100	200	ohms
Plate resistance (approx.)	0.0079	0.0069	0.75	meg
Transconductance	4000	5800	4600	μmhos
Amplification factor	42	40		
Plate current	7.8	8.5	7.7	ma
Grid 2 current			1.6	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	—10	—10	—10	volts

TYPICAL OPERATION	Triode as 250 mc Osc.‡	Pentode Mixer♦	
Plate voltage	150	150	volts
Grid 3 (suppressor)	connected to cathode at socket		
Grid 2 (screen) voltage		150	volts
Mixer grid 1 supply voltage		—3.5	volts
Oscillator voltage, rms at mixer grid 1		2.6	volts
Mixer grid 1 circuit resistance		0.12	meg
Oscillator grid resistor	2700		ohms
Conversion transconductance		2100	μmhos
Plate current	13	6.2	ma
Grid 2 current		1.8	ma
Grid 1 current		2.0	μa
Oscillator power output	0.5		watt

	Pentode Unit as Triode-Connected Mixer	
Plate voltage	150	volts
Grid 1 supply voltage	—3.5	volts
Oscillator voltage, rms at grid 1	2.6	volts
Grid 1 circuit resistance	0.12	meg
Conversion transconductance	2800	μmhos
Plate current	7.8	ma
Grid 1 current	2.0	μa

NOTES:

†Grid 3 connected to cathode, grid 2 connected to plate.

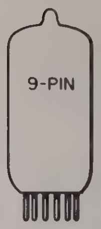
‡With separate excitation and triode unit grounded.

♦In TV or FM receivers it is generally desirable to operate the oscillator with less power input than given in the tabulated data in order to avoid over-excitation and excessive oscillator radiation.

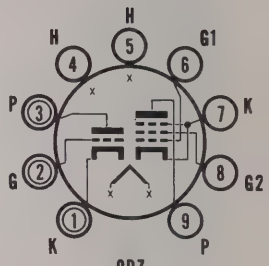
5AU4

(See chart for seldom-used tubes)

CBS 5AV8



Sync separator or sync clipper, etc. and i-f or video amplifier with heater warm-up controlled for series strings



9DZ

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 sec. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.

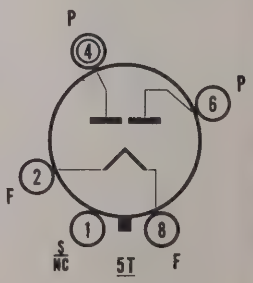
DIRECT INTERELECTRODE CAPACITANCES

Triode output: p to k + h	0.34	μμf
Pentode output: p to k + h + g2 + g3	3.0	μμf

Type 5AV8 is identical to type 5AN8 except for a different basing diagram and output capacitances. Type 5AV8 uses basing diagram 9DZ.

CBS 5AW4

High-vacuum, full-wave power rectifier



5T

FILAMENT CHARACTERISTICS

Voltage, a-c or d-c	5.0	volts
Current	3.7	amp

5AW4 (cont.)

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)
Rectifier Service

Plate voltage, peak inverse		1550	volts
Plate supply voltage, rms (each plate)‡	RATING CHART I*	550	volts
Output current, d-c	RATING CHART I*		
Plate current, peak steady state (each plate)	RATING CHART II*	.75	amp
Plate current, peak transient (each plate)	RATING CHART III*	4.0	amp

CHARACTERISTICS
Tube Voltage Drop

Conducting 250 ma (each plate)	46	volts

TYPICAL OPERATION
Full-Wave Rectifier (Capacitor Input Filter)

Plate supply voltage, rms (each plate)‡	450	volts
Plate supply resistance (each plate)	153	ohms
Filter input capacitor	10	μf
Output current, d-c	250	ma
Output voltage at filter input, d-c	422	volts

TYPICAL OPERATION
Full-Wave Rectifier (Choke Input Filter)

Plate supply voltage, rms (each plate)‡	550	volts
Filter input choke	10	henrys
Output current, d-c	250	ma

NOTES:

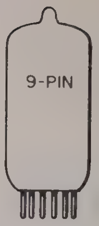
*Rating Charts given in APPENDIX of CBS Tube Manual.

‡The indicated value of a-c plate supply voltage is measured without load.

5AX4GT • 5AZ4

(See chart for seldom-used tubes)

CBS 5B8



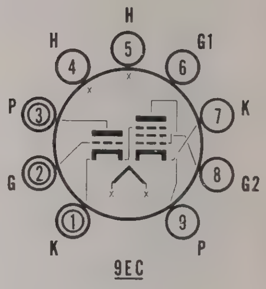
Sync clipper, sync separator, etc. and i-f or video amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

Grid to plate: g1 to p	1.7	μμf
Input: g1 to k + h + i.s. and pentode g3	1.9	μμf
Output: p to k + h + i.s. and pentode g3	1.4	μμf

Pentode Section

Grid to plate: g1 to p, max.	.032	μμf
Input: g1 to k + h + g2	6.0	μμf
Output: p to k + h + g2 + g3 and triode k	2.6	μμf
Plate to cathode: p to k + g2 + h	.15	μμf
Coupling: pentode grid 1 to triode plate	.0033	μμf
Coupling: pentode plate to triode grid	.0078	μμf
Coupling: pentode plate to triode plate	.060	μμf

MAXIMUM RATINGS (Design center values)

	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.6	2.0	watts
Grid 2 dissipation		0.5	watt
Grid 1 circuit resistance*			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Triode	Pentode	
Plate supply voltage	200	200	volts
Grid 2 (screen) supply voltage		150	volts
Grid 1 (control-grid) voltage	−6		volts
Cathode-bias resistor		180	ohms
Plate resistance (approx.)	.00575	0.30	meg
Transconductance	3300	6200	μmhos
Amplification factor	19		
Plate current	13	9.5	ma
Grid 2 current		2.8	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−19	−8	volts

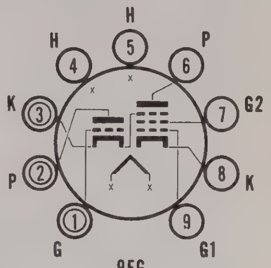
NOTE:

*If either unit is operating at maximum rated conditions, Grid 1 circuit resistance for both units should not exceed the values given.

CBS

5BE8

Triode-pentode for use as a vhf oscillator and mixer, heater warm-up controlled for series strings



9EG

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

Grid to plate: g1 to p	1.8	μμf
Input: g1 to k + h + pentode g3 + i.s.	2.8	μμf
Output: p to k + h + pentode g3 + i.s.	1.5	μμf

Pentode Section

Grid to plate: g1 to p, max.	.040	μμf
Input: g1 to k + h + g2	4.4	μμf
Output: p to k + h + g2 + g3 + triode k + i.s.	2.6	μμf
Plate to k + h + g2	.30	μμf
Coupling: pentode grid 1 to triode plate	.009	μμf
Coupling: triode grid to pentode plate	.010	μμf
Coupling: triode plate to pentode plate	.065	μμf

MAXIMUM RATINGS (Design center values)

	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.5	2.8	watts
Grid 2 dissipation		0.5	watt
Grid 1 circuit resistance†			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Triode	Pentode	
Plate voltage	150	250	volts
Grid 2 (screen) voltage		110	volts
Grid 1 (control-grid) voltage	0	0	volts
Cathode-bias resistor	56	68	ohms
Plate resistance (approx.)	.005	0.4	meg
Transconductance	8500	5200	μmhos
Amplification factor	40		
Plate current	18	10	ma
Grid 2 current		3.5	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−12	−10	volts

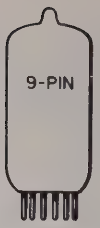
NOTES:

†Stated values should not be exceeded when either section is operating at maximum rated conditions.

‡When reading characteristics of pentode section all triode elements shall be at ground potential. Thus, because of internal connections to pin No. 3, the pentode suppressor will also be at ground.

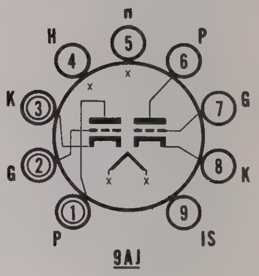
CBS

5BK7A



Vhf duotriode for cascode amplifier service, heater warm-up controlled for series strings

HEATER CHARACTERISTICS



Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode†	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1		Section 2	
Grid to plate: g1 to p	1.8		1.8	μμf
Input: g1 to k + h + i.s.	3.0		3.0	μμf
Output: p to k + h + i.s.	1.0		0.9	μμf
Heater to cathode : h to k	2.8		3.0	μμf
Grid 1 to grid 1: g1 to g1, max.		0.004		μμf
Plate to plate: p to p, max.		0.075		μμf
Plate to cathode: p to k	0.22		0.22	μμf
Grounded-grid input	6.0		6.0	μμf
Grounded-grid output	2.4		2.4	μμf

MAXIMUM RATINGS (Design center values)‡

Plate voltage	300	volts
Control-grid voltage, negative d-c	50	volts
Plate dissipation	2.7	watts

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier‡

Plate voltage	150	volts
Cathode-bias resistor	56	ohms
Plate resistance (approx.)	4600	ohms
Transconductance	9300	μmhos
Amplification factor	43	
Plate current	18	ma
Control-grid voltage (approx.) for $I_b = 10\ \mu a$	−11	volts
Noise figure▲	7	db

NOTES:

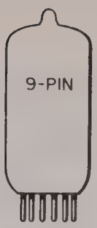
†Used as a cascode amplifier with the two sections series-connected, this voltage may be as high as 300 volts maximum under cutoff conditions.

‡Each section.

▲As measured in a cascode amplifier with a balanced 300-ohm input system which operates at a plate supply of 250 volts, plate current of 18 ma, a frequency of 200 mc, a stage bandwidth of 7 mc, and an effective noise bandwidth of 3.5 mc.

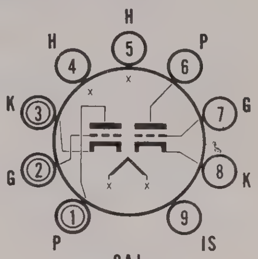
CBS

5BQ7A



High-gain, low-noise vhf cascode amplifier

HEATER CHARACTERISTICS



9AJ

Voltage, a-c or d-c	5.6 volts
Current	450 ma
Peak heater-cathode voltage, max.	
Heater neg. to cathode†	200 volts
Heater pos. to cathode★	200 volts
Warm-up time	11 secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

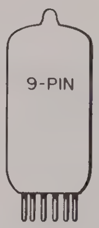
★D-c component must not exceed 100 volts max.

†When used as a cascode amplifier, with the two sections series-connected, this voltage may be as high as 300 volts at cutoff conditions.

Type 5BQ7A is identical to types 4BQ7A and 6BQ7A except for heater characteristics. See type 4BQ7A for ratings and operating characteristics.

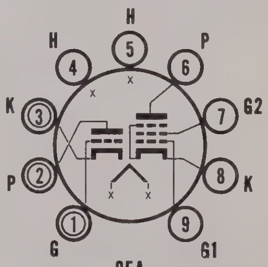
CBS

5BR8



Vhf local oscillator and mixer for fm and TV receivers

HEATER CHARACTERISTICS



9FA

Voltage, a-c or d-c	4.7 volts
Current	600 ma
Peak heater-cathode voltage, max.	
Heater neg. to cathode	250 volts
Heater pos. to cathode★	200 volts
Warm-up time	11 secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section	**No Shield**	**Shield♦**	
Grid to plate: g1 to p	1.8	1.8	μμf
Input: g1 to k + h	2.5	2.5	μμf
Output: p to k + h	0.4	1.0	μμf
Cathode to heater (either section)	3.0	3.0	μμf
Pentode Section			
Grid to plate: g1 to p	0.015	0.008	μμf
Input: g1 to k + h + g2 + g3 + i.s.	5.0	5.0	μμf
Output: p to k + h + g2 + g3 + i.s.	2.6	3.5	μμf

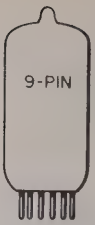
♦JETEC shield 315 connected to cathode.

MAXIMUM RATINGS (Design center values)	**Triode**	**Pentode**	
Plate voltage	300	300	volts
Grid 2 voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.7	2.8	watts
Grid 2 dissipation		0.5	watt

CHARACTERISTICS AND TYPICAL OPERATION

	Triode	**Pentode**	
Plate voltage	150	250	volts
Grid 3 (suppressor)	connected to cathode at socket		
Grid 2 (screen) supply voltage		110	volts
Cathode-bias resistor	56	68	ohms
Plate resistance (approx.)	.005	.40	meg
Transconductance	8500	5200	μmhos
Amplification factor	40		
Plate current	18	10	ma
Grid 2 current		3.5	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−12	−10	volts

CBS 5CG8



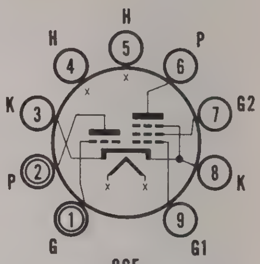
Vhf oscillator and mixer, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



9GF

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section	**No Shield**	**Shield♦**	
Grid to plate: g1 to p, max.	1.5	1.5	μμf
Input: g1 to k + h	2.6	3.0	μμf
Output: p to k + h	0.05	1.0	μμf
Pentode Section			
Grid to plate: g1 to p	0.03	0.016	μμf
Input: g1 to k + h + g2 + g3	4.8	5.0	μμf
Output: p to k + h + g2 + g3	0.9	1.6	μμf
Coupling: pentode grid 1 to triode plate, max.	0.04	0.05	μμf
Coupling: pentode plate to triode plate, max.	0.007	0.05	μμf
Heater to cathode: h to k	5.5	5.5*	μμf

♦JETEC shield 315 connected to cathode.

*JETEC shield 315 connected to ground.

MAXIMUM RATINGS (Design center values)

Converter Service	**Triode as Oscillator**	**Pentode as Mixer**	
Plate voltage	250	250	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		250	volts
Grid 1 voltage, positive d-c	0	0	volts
Grid 1 voltage, negative d-c	40	40	volts
Plate dissipation	1.5	2	watts
Grid 2 dissipation†		0.5	watt
Grid 2 dissipation‡	See Rating Chart in APPENDIX		
Grid 1 dissipation	0.5		watt
Grid 1 circuit resistance			
Fixed bias		0.1	meg
Self bias		0.5	meg

CHARACTERISTICS

	Triode	**Pentode**	
Plate voltage	100	250	volts
Grid 2 (screen) voltage		150	volts
Cathode-bias resistor	100	200	ohms
Plate resistance (approx.)	6900	750,000	ohms
Transconductance	5800	4600	μmhos
Amplification factor	40		
Plate current	8.5	7.7	ma
Grid 2 current		1.6	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−10	−10	volts

5CG8 (cont.)

TYPICAL OPERATION	Triode as 250 mc Oscillator▲	Pentode as Mixer▼	
Plate voltage	150	150	volts
Grid 2 (screen) voltage		150	volts
Mixer grid 1 supply voltage		−3.5	volts
Oscillator voltage (rms) at mixer grid 1		2.6	volts
Mixer grid 1 (control grid) circuit resistance		120,000	ohms
Oscillator grid resistance	2700		ohms
Conversion transconductance		2100	μmhos
Plate current	13	6.2	ma
Grid 2 (screen) current		1.8	ma
Grid 1 (control grid) current	3.6		ma
Grid 1 (control grid) current		2	μa
Oscillator power output (approx.)	0.5		watt

NOTES:

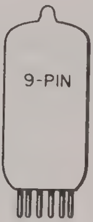
†For grid 2 voltages up to 150 volts.

‡For grid 2 voltages between 150 and 300 volts.

▲In TV and f-m receivers, it is generally desirable to operate the oscillator with less power input than shown in the tabulated data to avoid over-excitation and excessive oscillator radiation.

▼With separate excitation and triode unit grounded.

CBS 5CL8

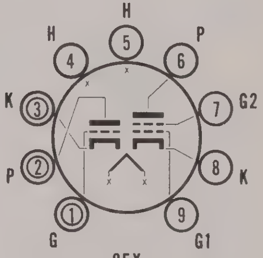


Vhf oscillator and mixer, heater warm-up controlled for series strings

HEATER CHARACTERISTICS		
Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



9FX

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section	No Shield	Shield♦	
Grid to plate: g1 to p	1.8	1.8	μμf
Input: g1 to k + h	2.7	2.7	μμf
Output: p to k + h	0.4	1.2	μμf
Heater to cathode: h to k	2.5	2.5	μμf

Tetrode Section	No Shield	Shield♦	
Grid to plate: g1 to p, max.	.028	.016	μμf
Input: g1 to k + h + g2	5.0	5.0	μμf
Output: p to k + h + g2	2.0	3.0	μμf
Heater to cathode: h to k	2.5	2.5	μμf

♦JETEC shield 315 connected to cathode.

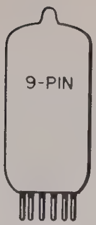
MAXIMUM RATINGS (Design center values)

	Triode	Tetrode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.7	2.8	watts
Grid 2 dissipation		0.5	watt
Grid 1 circuit resistance			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Triode	Tetrode	
Plate voltage	125	125	volts
Grid 2 (screen) voltage		125	volts
Grid 1 (control-grid) voltage	0	—1.0	volts
Cathode-bias resistor	56		ohms
Plate resistance (approx.)	.005	0.1	meg
Transconductance	8000	5800	μmhos
Amplification factor	40		
Plate current	15	12	ma
Grid 2 current		4.0	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	—9	—10	volts

CBS 5CM6



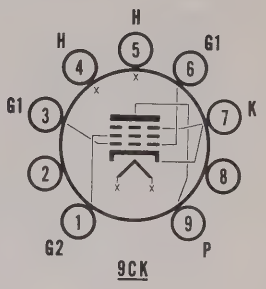
General purpose audio power amplifier or vertical deflection amplifier in TV receivers, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.7	μμf
Input: g1 to k + h + g2 + b.p.	8.0	μμf
Output: p to k + h + g2 + b.p.	8.5	μμf

MAXIMUM RATINGS (Design center values unless noted)

	Class A Amplifier	Vertical Deflection Amplifier* Pentode	Vertical Deflection Amplifier* Triode‡	
Plate voltage	315	315	315	volts
Plate voltage, peak pos. (absolute max.)		2000	2000	volts
Grid 2 voltage	285	285		volts
Grid 1 voltage, peak negative		250	250	volts
Plate dissipation†	12	8	9	watts
Grid 2 dissipation	2.0	1.75		watts
Cathode current, average		40	40	ma
Cathode current, peak		120	120	ma
Grid 1 circuit resistance				
Fixed bias	0.1			meg
Self bias	0.5	2.2	2.2	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Single Tube	Single Tube	Two Tubes (Push-Pull)	
Plate voltage	180	315	250	volts
Grid 2 (screen) voltage	180	225	250	volts
Grid 1 (control-grid) voltage	−8.5	−13.0	−15.0	volts
Plate resistance (approx.)	50,000	80,000		ohms
Transconductance	3700	3750		μmhos
Grid 1 input voltage, peak a-f	8.5	13	30▲	volts
Plate current, zero signal	29	34	70	ma
Plate current, maximum signal	30	35	79	ma
Grid 2 current, zero signal	3.0	2.2	5.0	ma
Grid 2 current, maximum signal	4.0	6.0	13.0	ma
Load resistance impedance	5500	8500	10,000⧫	ohms
Total harmonic distortion (approx.)	8	12	5	%
Power output, maximum signal	2.0	5.5	10	watts

Vertical Deflection Amplifier*	Pentode	Triode	
Plate voltage	250	250	volts
Grid 2 (screen) voltage	250		volts
Grid 1 (control-grid) voltage	−12.5	−12.5	volts
Plate resistance, per tube	50,000	1960	ohms
Transconductance	4100	5000	μmhos
Plate current	45	49.5	ma
Grid 2 current	4.5		ma
Grid 1 bias for $I_b = 0.5$ ma	−37	−37	volts
Amplification		9.8	

*Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

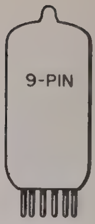
†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

‡Grid 2 connected to plate. ⧫Plate to plate. ▲Grid to grid.

CBS ELECTRON TUBES

CBS

5CM8



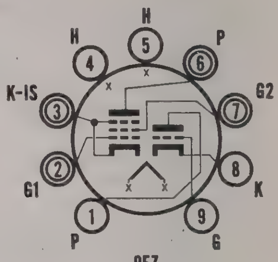
Multipurpose triode-pentode television amplifier, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



9FZ

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

Grid to plate: g1 to p	1.9	μμf
Input: g1 to k + h	1.6	μμf
Output: p to k + h	0.22	μμf

Pentode Section

Grid to plate: g1 to p, max.	0.02	μμf
Input: g1 to k + h + g2 + g3 + i.s.	6.0	μμf
Output: p to k + h + g2 + g3 + i.s.	2.6	μμf
Coupling: pentode grid 1 to triode plate	0.15	μμf
Coupling: pentode plate to triode grid	0.01	μμf
Coupling: pentode plate to triode plate	0.10	μμf

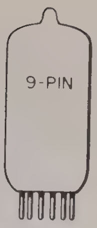
MAXIMUM RATINGS (Design center values)

	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	1.0	2.0	watts
Grid 2 dissipation		0.5	watts
Grid 1 circuit resistance			
Fixed bias		2.5	meg
Self bias		1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Triode	Pentode	
Plate supply voltage	250	200	volts
Grid 3 (suppressor)	connected to cathode at socket		
Grid 2 (screen) voltage		150	volts
Grid 1 (control-grid) voltage	−2	0	volts
Cathode-bias resistor		180	ohms
Plate resistance (approx.)	50,000	300,000	ohms
Transconductance	2000	6200	μmhos
Amplification factor	100		
Plate current	1.8	9.5	ma
Grid 2 current		2.8	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$		−8.0	volts

CBS 5CZ5



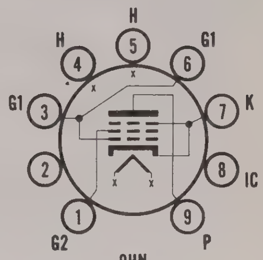
Beam power tube for 110° vertical deflection or audio power amplifier service, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



9HN

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	0.7	μμf
Input: g1 to k + h + g2 + b.p.	8.0	μμf
Output: p to k + h + g2 + b.p.	8.5	μμf

MAXIMUM RATINGS (Design center values unless noted)

	Vertical† Defl. Amp.	Class A Amplifier	P-P Class AB1 Amplifier	
Plate voltage, d-c	350	350	350	volts
Plate voltage, peak positive pulse (absolute max.)	2200			volts
Grid 2 voltage	285	285	285	volts
Grid 1 voltage, peak negative	—250			volts
Plate dissipation	10	12	12	watts
Grid 2 dissipation	2	2	2	watts
Cathode current, av.	40			ma
Cathode current, peak	140			ma
Grid 1 circuit resistance				
Fixed bias	0.5	0.1	0.1▲	meg
Self bias	1.0	1.0	1.0▲	meg
Bulb temperature at hottest point	250	250	250	°C

CHARACTERISTICS AND TYPICAL OPERATION

		Class A	Class A, A-F Power	P-P Class AB1,▼ A-F Power	
Plate voltage	75	200	250	350	volts
Grid 2 (screen) voltage	250	250	250	280	volts
Grid 1 (control-grid) voltage	0	—14	—14	—23.5▲	volts
Plate resistance (approx)		73,000	73,000		ohms
Transconductance		4800	4800		μmhos
Grid 1 input voltage, peak a-f			13	47♦	volts
Plate current, zero signal	130*	46	46	46	ma
Plate current, maximum signal			48	103	ma
Grid 2 current	16*	4.6			ma
Grid 2 current, zero signal			4.6	3	ma
Grid 2 current, maximum signal			8.0	13	ma
Grid 1 bias for $I_b = 100\ \mu a$		—35			volts
Load resistance impedance			5000	7500♦	ohms
Total harmonic distortion (approx.)			10	1	%
Power output, maximum signal			5.4	21.5	watts

NOTES:

†Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

*Values are measurable by a method involving a recurrent waveform such that plate dissipation and grid 2 input will be kept within their ratings.

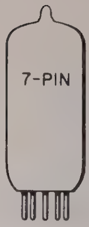
▲The input coupling network should not introduce excessive resistance into the grid 1 circuit. Transformer or impedance-coupling devices are recommended.

♦Grid 1 to grid 1. ▼Values are for two tubes.

♦Plate to plate.

CBS

5J6



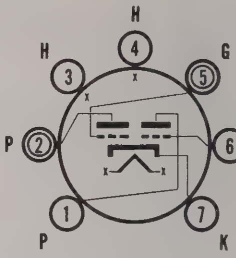
Vhf oscillator, amplifier, or mixer, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode★	100	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



7BF

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1		Section 2		
	No Shield	Shield⧫	No Shield	Shield⧫	
Grid to plate: g1 to p	1.6	1.5	1.6	1.5	μμf
Input: g1 to k +h	2.2	2.6	2.2	2.6	μμf
Output: p to k + h	0.4	1.6	0.4	1.0	μμf

⧫JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

Class A Amplifier (each section)

Plate voltage	300	volts
Control-grid voltage, positive d-c	0	volts
Plate dissipation	1.5	watts
Control-grid circuit resistance (self bias)†	0.5	meg

Class C Oscillator (each section)

Plate voltage	300	volts
Control-grid voltage, negative d-c	40	volts
Control-grid voltage, positive d-c	0	volts
Plate dissipation	1.5	watts
Plate input	4.5	watts
Plate current	15	ma
Grid current	8.0	ma

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier (each section)

Plate voltage	100	volts
Cathode-bias resistor	50	ohms
Plate resistance (approx.)	7100	ohms
Transconductance	5300	μmhos
Amplification factor	38	
Plate current	8.5	ma

Class C Oscillator, R-F Power Amplifier & Oscillator (Both sections push-pull)

Plate voltage	150	volts
Grid voltage‡	—10	volts
Plate current	30	ma
Grid current (approx.)	16	ma
Grid driving power (approx.)	0.35	watt
Power output (approx.)	3.5	watts

5J6 (cont.)

Mixer Service▲

Plate voltage	150	volts
Cathode-bias resistor	810	ohms
Oscillator peak voltage	3.0	volts
Plate resistance (approx.)	10,200	ohms
Conversion transconductance	1900	μmhos
Plate current	4.8	ma

NOTES:

†Under rated maximum conditions total grid circuit resistance should not exceed 0.5 meg. Fixed bias operation is not recommended.

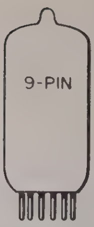
‡Obtained by a 625-ohm grid resistor, a 220-ohm cathode resistor or a fixed voltage supply.

▲Each section operated separately with grid and plate of opposite sections grounded. The value of the cathode-bias resistor is determined by the total cathode current of both sections.

5T4

(See chart for seldom-used tubes)

CBS 5T8



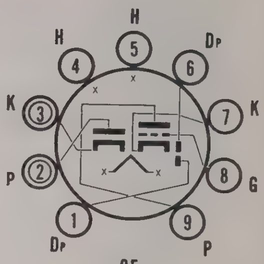
Combined a-m, f-m detector and audio amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode★	100	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



9E

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Shield♦	No Shield	
Grid to plate: g1 to p	1.7	1.7	μμf
Input: g1 to k + h + i.s.	1.7	1.6	μμf
Output: p to k + h + i.s.	2.5	1.2	μμf
Grid to any diode plate, max.	0.035	0.035	μμf
Diode 1 input	3.9	3.7	μμf
Diode 2 input	3.9▲	3.7	μμf
Diode 3 input	3.6	3.4	μμf
Diode 2 cathode to all	8.8♠	7.7	μμf

♦ JETEC shield 315 connected to pin 7 except as noted

▲JETEC shield 315 connected to pin 3

♠ JETEC shield 315 connected to pins 4 and 5

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Control-grid voltage, positive d-c	0	volts
Plate dissipation	1.0	watt
Diode current*	5.0	ma

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	100	250	volts
Control-grid voltage	—1	—3	volts
Plate resistance (approx.)	54,000	58,000	ohms
Transconductance	1300	1200	μmhos
Amplification factor	70	70	
Plate current	0.8	1.0	ma
Diode current (average)†	20	20	ma

NOTES:

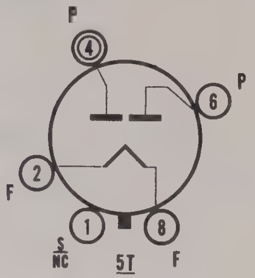
*Each diode, continuous operation.

†Each diode with 5.0V d-c applied.

CBS

5U4G

High-vacuum full-wave power rectifier



FILAMENT CHARACTERISTICS

Voltage, a-c	5.0	volts
Current	3.0	amp

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Plate voltage, peak inverse		1550	volts
Plate supply voltage, rms (each plate)†	RATING CHART I*		
Output current, d-c	RATING CHART I*		
Plate current, peak steady state (each plate)	RATING CHART II*	800	ma
Plate current, peak transient (each plate)	RATING CHART III*	4.0	amp

CHARACTERISTICS

Tube Voltage Drop

Conducting 225 ma (each plate)	44	volts

TYPICAL OPERATION

Full-Wave Rectifier (Capacitor Input Filter)

Plate supply voltage, rms (each plate)†	300	450	volts
Plate supply resistance (each plate)	35	85	ohms
Filter input capacitor	40	40	μf
Output current, d-c	245	225	ma
Output voltage at filter input, d-c	290	470	volts

TYPICAL OPERATION

Full-Wave Rectifier (Choke Input Filter)

Plate supply voltage, rms (each plate)†	550	volts
Filter input choke	10	henrys
Output current, d-c	225	ma
Output voltage at filter input, d-c	440	volts

NOTES:

*Rating Charts given in APPENDIX of CBS Tube Manual.

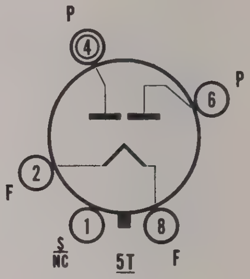
†The indicated values of a-c plate supply voltage are measured without load.

CBS

5U4GB

5U4GA

High-vacuum full-wave power rectifier with high d-c current output



FILAMENT CHARACTERISTICS

Voltage, a-c or d-c	5.0	volts
Current	3.0	amp

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Rectifier Service†

		5U4GA	5U4GB	
Plate voltage, peak inverse		1550	1550	volts
Plate supply voltage, rms (each plate)‡	RATING CHART I*	550	550	volts
Output current, d-c	RATING CHART I*			
Plate current, peak steady state (each plate)	RATING CHART II*	0.9	1.0	amp
Plate current, peak transient (each plate)	RATING CHART III*	4.3	4.6	amp

CHARACTERISTICS

Tube Voltage Drop

Conducting 225 ma (each plate)	44	volts
Conducting 275 ma (each plate)	50	volts
Conducting 300 ma (each plate)	54	volts

TYPICAL OPERATION

Full-Wave Rectifier (Capacitor Input Filter)

	5U4GB▲		
Plate supply voltage, rms (each plate‡	300	450	volts
Plate supply resistance (each plate)	21	67	ohms
Filter input capacitor	40	40	μf
Output current, d-c	300	275	ma
Output voltage at filter input, d-c	290	460	volts

TYPICAL OPERATION

Full-Wave Rectifier (Choke Input Filter)

	5U4GA	5U4GB	
Plate supply voltage, rms (each plate)‡	550	550	volts
Filter input choke	10	10	henrys
Output current, d-c	250	275	ma
Output voltage at filter input, d-c	440	420	volts

NOTES:

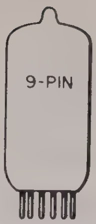
*Rating Charts given in APPENDIX of CBS Tube Manual for 5U4GB.

†For use with sinusoidal supply voltages within the frequency range of 25 to 1000 c.p.s.

‡The indicated value of a-c plate supply voltage is measured without load.

▲Operation for type 5U4GA is identical except for an output current of 275 ma at 300V, and 250 ma at 450V with total R_s of 25 and 67 ohms, respectively.

CBS 5U8



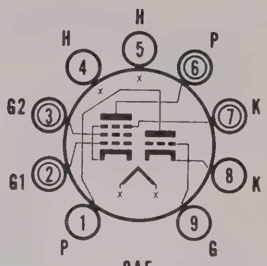
Vhf oscillator and mixer, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



9AE

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section	No Shield	Shield♦	
Grid to plate: g1 to p	1.8	1.8	μμf
Input: g1 to k + h	2.5	2.5	μμf
Output: p to k + h	0.4	1.0	μμf
Heater to cathode: h to k	3.0	3.0	μμf
Pentode Section			
Grid to plate: g1 to p, max.	0.01	0.006	μμf
Input: g1 to k + h + g2 + g3	5.0	5.0	μμf
Output: p to k + h + g2 + g3	2.6	3.5	μμf
Heater to cathode: h to k	3.0	3.0	μμf

♦JETEC shield 315 connected to cathode.

MAXIMUM RATINGS (Design center values)

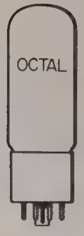
	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.7	2.8	watts
Grid 2 dissipation		0.5	watt

CHARACTERISTICS AND TYPICAL OPERATION

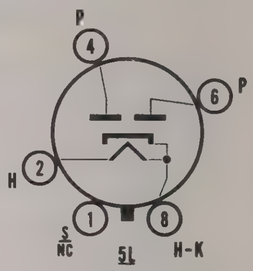
	Triode	Pentode	
Plate voltage	150	250	volts
Grid 2 (screen) voltage		110	volts
Cathode-bias resistor	56	68	ohms
Plate resistance (approx.)	5000	400,000	ohms
Transconductance	8500	5200	μmhos
Amplification factor	40		
Plate current	18	10	ma
Grid 2 current		3.5	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−12	−10	volts

5V4G

5V4GA



High-vacuum full-wave power rectifier



HEATER CHARACTERISTICS

Voltage, a-c or d-c	5.0	volts
Current	2.0	amp

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Rectifier Service

Plate voltage, peak inverse	1400	volts
Plate current, peak steady state (each plate)	525	ma
Plate current, peak transient (each plate)	3.5	amp

CHARACTERISTICS

Tube Voltage Drop

Conducting 175 ma (each plate)	25	volts

TYPICAL OPERATION

Full-Wave Rectifier (Capacitor Input Filter)

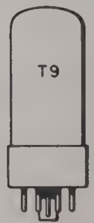
Plate supply voltage, rms (each plate)	375	volts
Plate supply impedance, min. (each plate)	100	ohms
Filter input capacitor	10	μf
Output current, d-c	175	ma
Output voltage at filter input, d-c	410	volts

TYPICAL OPERATION

Full-Wave Rectifier (Choke Input Filter)

Plate supply voltage, rms (each plate)	500	volts
Filter input choke	4.0	henrys
Output current, d-c	175	ma
Output voltage at filter input, d-c	410	volts

5V6GT



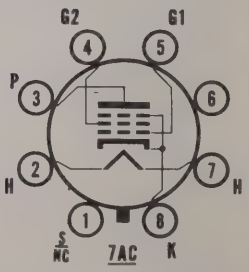
Audio power amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



5V6GT (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.7	μμf
Input: g1 to k + h + g2 + b.p.	9.0	μμf
Output: p to k + h + g2 + b.p.	7.5	μμf

MAXIMUM RATINGS (Design center values unless noted)

Class A Amplifier

Plate voltage	315	volts
Grid 2 voltage	285	volts
Grid 2 supply voltage	315	volts
Plate dissipation*	12	watts
Grid 2 dissipation	2	watts
Grid 1 circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg

Vertical Deflection Amplifier† (triode connected)‡

Plate voltage	315	volts
Plate voltage, peak positive pulse (absolute max.)	1200	volts
Grid voltage, peak negative	250	volts
Plate dissipation*	9.0	watts
Cathode current, average	35	ma
Cathode current, peak	105	ma
Grid 1 circuit resistance, self bias	2.2	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier (Single Tube)

Plate voltage	180	250	315	volts
Grid 2 (screen) voltage	180	250	225	volts
Grid 1 (control-grid) voltage	−8.5	−12.5	−13.0	volts
Plate resistance (approx.)	50,000	50,000	80,000	ohms
Transconductance	3700	4100	3750	μmhos
Grid 1 input voltage, peak a-f	8.5	12.5	13.0	volts
Plate current, zero signal	29	45	34	ma
Plate current, maximum signal	30	47	35	ma
Grid 2 current, zero signal	3.0	4.5	2.2	ma
Grid 2 current, maximum signal	4.0	7.0	6.0	ma
Load resistance impedance	5500	5000	8500	ohms
Total harmonic distortion (approx.)	8	8	12	%
Power output, maximum signal	2.0	4.5	5.5	watts

Class A Push-Pull Amplifier (Two Tubes)

Plate voltage	250	285	volts
Grid 2 (screen) voltage	250	285	volts
Grid 1 (control-grid) voltage	−15	−19	volts
Grid-to-grid input voltage, peak a-f	30	38	volts
Plate current, zero signal	70	70	ma
Plate current, maximum signal	79	92	ma
Grid 2 current, zero signal	5	4	ma
Grid 2 current, maximum signal	13.0	13.5	ma
Load resistance, plate-to-plate	10,000	8000	ohms
Total harmonic distortion (approx.)	5.0	3.5	%
Power output, maximum signal	10	14	watts

Triode Connected‡

Plate and grid 2 voltage (p + g2 tied together)	250	volts
Grid 1 voltage	−12.5	volts
Plate resistance (approx.)	1960	ohms
Transconductance	5000	μmhos
Grid 1 input voltage for $I_b = 0.5$ ma	−36	volts
Amplification factor	9.8	
Plate current	49.5	ma

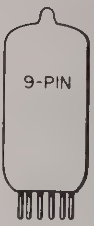
NOTES:

*Tube protection is needed for no-drive conditions if grid-resistor bias is used.

†Voltage pulse duration must not exceed 2500μs in a 525-line, 30-frame system.

‡Screen tied to plate.

CBS 5X8



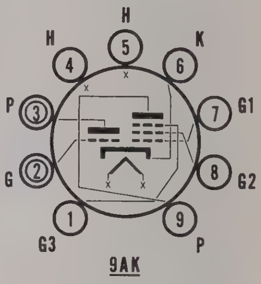
Vhf oscillator and mixer, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode★	100	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section	No Shield	Shield♦	
Grid to plate: g1 to p	1.4	1.4	μμf
Input: g1 to k + h	2.0	2.6	μμf
Output: p to k + h	0.5	1.0	μμf

Pentode Section	No Shield	Shield♦	
Grid to plate: g1 to p	0.09	0.06	μμf
Input: g1 to k + h + g2 + g3	4.3	4.5	μμf
Output: p to k + h + g2 + g3	0.7	1.4	μμf
Coupling: pentode grid 1 to triode plate	0.045	0.035	μμf
Coupling: pentode plate to triode plate	0.040	0.008	μμf

♦JETEC shield 315 connected to cathode.

MAXIMUM RATINGS (Design center values)

Converter Service	Triode as Oscillator	Pentode as Mixer	
Plate voltage	250	250	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		250	volts
Grid 1 voltage, positive d-c	0	0	volts
Grid 1 voltage, negative d-c	40	40	volts
Plate dissipation	1.5	2.0	watts
Grid 2 input		0.4	watt
Grid 1 input	0.5		watt
Grid 1 circuit resistance			
Fixed bias	0.1	0.1	meg
Self bias	0.5	0.5	meg

Pentode Section as Triode-Connected Mixer†		
Plate voltage	250	volts
Grid 1 voltage, positive d-c	0	volts
Grid 1 voltage, negative d-c	40	volts
Plate dissipation	2.4	watts

5X8 (cont.)

CHARACTERISTICS

	Triode	Pentode	
Plate voltage	100	250	volts
Grid 3 (suppressor)	connected to cathode at socket		
Grid 2 (screen) voltage		150	volts
Cathode-bias resistor	100	200	ohms
Plate resistance (approx.)	6900	750,000	ohms
Transconductance	5800	4600	μmhos
Amplification factor	40		
Plate current	8.5	7.7	ma
Grid 2 current		1.6	ma
Grid 1 voltage (approx.) for $I_b = 10$ μa	−10	−10	volts

Pentode Section Connected as Triode

Plate voltage	150	volts
Grid 3 (suppressor)	connected to cathode at socket	
Grid 2 (screen) voltage	connected to plate	
Cathode-bias resistor	250	ohms
Plate resistance (approx.)	7900	ohms
Transconductance	4000	μmhos
Amplification factor	42	
Plate current	7.8	ma
Grid 1 voltage (approx.) for $I_b = 10$ μa	−10	volts

TYPICAL OPERATION

Triode 250mc oscillator and pentode mixer	Triode▼	Pentode♦	
Plate voltage	150	150	volts
Grid 3 (suppressor)	connected to cathode at socket		
Grid 2 (screen) voltage		150	volts
Mixer grid 1 (control grid) supply voltage		−3.5	volts
Oscillator voltage (rms) at mixer grid 1		2.6	volts
Mixer grid 1 (control grid) circuit resistance		120,000	ohms
Oscillator grid resistor	2700		ohms
Conversion transconductance		2100	μmhos
Plate current	13	6.2	ma
Grid 2 (screen) current		1.8	ma
Grid 1 (control grid) current	3.6		ma
Grid 1 (control grid) current		2.0	μa
Oscillator power output (approx.)	0.5		watt

Pentode Section as Triode-Connected Mixer†

Plate voltage	150	volts
Grid 1 (control grid) supply voltage	−3.5	volts
Oscillator voltage (rms) at grid 1	2.6	volts
Grid 1 (control grid) circuit resistance	120,000	ohms
Conversion transconductance	2800	μmhos
Plate current	7.8	ma
Grid 1 (control grid) current	2.0	μa

NOTES:

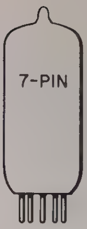
†Grid 3 (suppressor) connected to cathode; Grid 2 (screen) connected to plate.

▼In TV or f-m receivers, it is desirable to operate the oscillator with less power input than given to avoid over-excitation and excessive radiation.

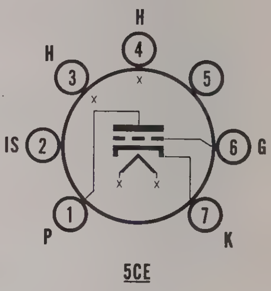
♦With separate excitation and triode unit grounded.

CBS

6AB4



Vhf triode for oscillator or grounded—grid amplifier service



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p	1.5	1.5	μμf
Input: g1 to k + h	2.2	2.2	μμf
Output: p to k + h	0.50	1.4	μμf
Heater to cathode: h to k	2.9	2.9	μμf
Grounded grid operation			
Plate to cathode: p to k	0.24	0.20	μμf
Input: g1 to k + h	5.0	5.2	μμf
Output: p to k + h	1.7	2.6	μμf

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Control-grid voltage, negative d-c	50	volts
Plate dissipation	2.5	watts

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	100	250	volts
Cathode-bias resistor	270	200	ohms
Plate resistance (approx.)	15,000	10,900	ohms
Transconductance	4000	5500	μmhos
Amplification factor	60	60	
Plate current	3.7	10	ma
Control-grid voltage (approx.) for $I_b = 10\ \mu a$	—5	—12	volts

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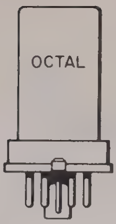
6AB5/6N5 • 6AB6G
6AB7/1853 • 6AC5G/GT
6AC6GT

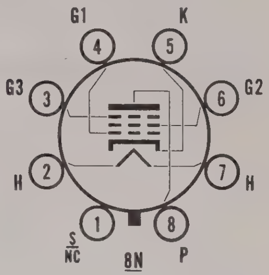
(See chart for seldom-used tubes)

CBS

6AC7



High gain amplifier for r-f, i-f, and video stages



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield♦

Grid to plate: g1 to p, max.	.015	μμf
Input: g1 to k + h + g2 + g3	11.0	μμf
Output: p to k + h + g2 + g3	5.0	μμf

♦Shell connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	150	volts
Grid 2 supply voltage	300	volts
Plate dissipation	3.02	watts
Grid 2 dissipation	0.38	watt
Grid 1 circuit resistance with self bias*		
Fixed screen voltage	0.25	meg
Series screen resistor	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	**Condition 1†**	**Condition 2‡**	
Plate voltage	300	300	volts
Grid 3 (suppressor)▲	0	0	volts
Grid 2 supply voltage	150	300	volts
Cathode bias resistor, min.▼	160	160	ohms
Screen series resistor		60,000	ohms
Plate resistance (approx.)	1.0	1.0	meg
Transconductance	9000	9000	μmhos
Plate current	10	10	ma
Grid 2 current	2.5	2.5	ma

NOTES:

*For maximum voltage conditions and with cathode bias.

†Sharp cutoff if fixed screen supply is used.

‡Extended cutoff if screen resistor is used.

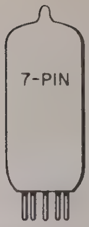
▲In r-f and i-f stages, connect suppressor directly to ground for minimum feedback.

▼Adjusted to give a plate current of 10 ma.

6AD5G/GT • 6AD6G • 6AD7G
6AE5GT • 6AE6G • 6AE7G/GT

(See chart for seldom-used tubes)

6AF4

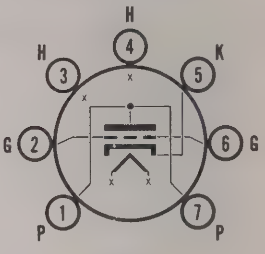


6AF4A

Triode local oscillator for uhf television tuners

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	225	ma



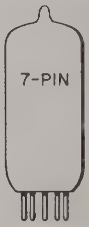
7DK

Types 6AF4 and 6AF4A are identical to types 2AF4 and 2AF4A, respectively except for heater characteristics.

6AF5G • 6AF6G

(See chart for seldom-used tubes)

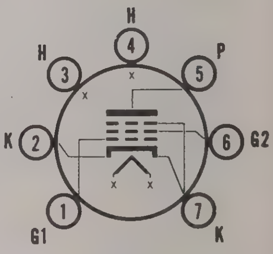
6AG5



R-f or i-f pentode amplifier at frequencies up to about 400 mc

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



7BD

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p, max.	0.03	0.02	μμf
Input: g1 to k + h + g2 + g3	6.5	6.6	μμf
Output: p to k + h + g2 + g3	1.8	3.1	μμf
Triode connection*			
Grid to plate: g1 to p	2.5	2.5	μμf
Input: g1 to h + k + g3 + i.s.	3.6	3.6	μμf
Output: p and g2 to h + k + g3 + i.s.	3.0	4.3	μμf

♦JETEC shield 316 connected to cathode.

6AG5 (cont.)

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	300	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	2.0	watts
Grid 2 dissipation	0.5	watts
Plate voltage*	300	volts
Grid 1 voltage, positive d-c*	0	volts
Plate and grid 2 dissipation (total)*	2.5	watts

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	100	125	250	volts
Grid 2 (screen) voltage	100	125	150	volts
Cathode bias resistor	180	100	180	ohms
Plate resistance (approx.)	0.6	0.5	0.8	meg
Transconductance	4500	5100	5000	μmhos
Plate current	4.5	7.2	6.5	ma
Grid 2 current	1.4	2.1	2.0	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−5	−6	−8	volts

Class A Amplifier-triode connection*

Plate voltage	180	250	volts
Cathode bias resistor	330	820	ohms
Plate resistance, approx.	.008	.01	meg
Amplification factor	45	42	
Transconductance	5700	3800	μmhos
Plate and grid 2 current, total	7	5.5	ma

NOTE:

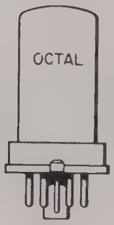
*Triode connection: grid 2 (screen) tied to plate.

6AG6G

(See chart for seldom-used tubes)

CBS

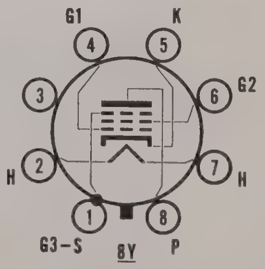
6AG7



Video power amplifier with high transconductance and high power sensitivity

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	650	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield♦

Grid to plate: g1 to p, max.	0.06	μμf
Input: g1 to k + h + g2 + g3	13.0	μμf
Output: p to k + h + g2 + g3	7.5	μμf
Grid 1 to grid 2 (approx.)	5.8	μμf
Grid 1 to cathode (approx.)	5.2	μμf
Heater to cathode (approx.)	10.7	μμf

♦Shell connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	300	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	9.0	watts
Grid 2 dissipation	1.5	watts
Grid 1 circuit resistance		
Fixed bias	0.25	meg
Self bias	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	300	volts
Grid 2 (screen) voltage	150	volts
Grid 1 (control-grid) voltage	−3	volts
Grid 1 input voltage, peak a-f	3	volts
Plate current, zero signal	30	ma
Plate current, maximum signal	30.5	ma
Grid 2 current, zero signal	7	ma
Grid 2 current, maximum signal	9	ma
Plate resistance (approx.)	0.13	meg
Transconductance	11,000	μmhos
Load resistance	10,000	ohms
Total harmonic distortion	7	%
Power output, maximum signal	3	watts

Class A Video Voltage Amplifier (4 mc bandwidth)*

	Grid resistor† bias	Cathode bias	
Plate supply voltage	300	300	volts
Grid 2 (screen) voltage	115‡	125 ▲	
Grid 1 (control-grid) voltage, zero signal	0	−2.0	volts
Grid 1 resistor	.25 to 0.5		meg
Cathode resistor		57	ohms
Grid 1 signal voltage (peak to peak)	4.0	4.0	volts
Plate current, zero signal	45	28	ma
Grid 2 current, zero signal	13	7	ma
Load resistor	3500	3500	ohms
Voltage output (peak to peak)	135	140	volts

NOTES:

*With I. S. (Pin 3) connected to ground.

†Intended for use where d-c restoration is accomplished in the grid circuit of the 6AG7.

‡Obtained from a regulated power supply.

▲Obtained from the plate supply voltage through a screen-dropping resistor of 25,000 ohms.

CBS

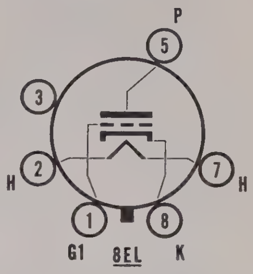
6AH4GT

Vertical-deflection-output amplifier for television

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	750	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p	4.4	4.2	μμf
Input: g1 to k + h	7.0	7.5	μμf
Output: p to k + h	1.7	3.2	μμf

♦JETEC shield 308 connected to ground.

MAXIMUM RATINGS (Design center values unless noted)

Vertical Deflection Amplifier†

Plate voltage, d-c	500	volts
Plate voltage, peak pos. (absolute max.)	2000	volts
Control-grid voltage, peak negative	200	volts
Plate dissipation‡	7.5	watts
Cathode current, average	60	ma
Cathode current, peak	180	ma
Control-grid circuit resistance, fixed bias	2.2	meg

AVERAGE CHARACTERISTICS

Plate voltage	250	250	volts
Control-grid voltage	−33	−23	volts
Plate resistance (approx.)		1780	ohms
Transconductance		4500	μmhos
Amplification factor		8.0	
Plate current	5.0	30	ma
Grid 1 voltage (approx.) for $I_b = 0.5$ ma		−40	volts

TYPICAL OPERATION

Vertical Deflection Amplifier▲

Plate voltage	240	volts
Control-grid input voltage (approx.)		
Sawtooth component	52	volts
Negative peak component	87	volts
Cathode-bias resistor▼	1100	ohms
Cathode current, average d-c	22	ma
Cathode current, peak to peak	62	ma
Plate output voltage (approx.)		
Sawtooth component	150	volts
Positive peak component	900	volts

NOTES:

†Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

‡Tube protection is needed for no-drive conditions if grid-resistor bias is used.

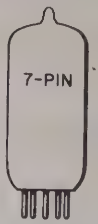
▲For use in conjunction with a 70° picture tube operating at 15 kv anode voltage.

▼Typical value of total cathode resistance for optimum linearity.

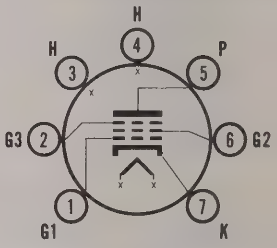
6AH5G

(See chart for seldom-used tubes)

CBS 6AH6



Sharp-cutoff pentode amplifier for r-f, i-f, or video circuits



7CC

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield♦

Grid to plate: g1 to p, max.	0.020	μμf
Input: g1 to k + h + g2 + g3	10	μμf
Output: p to k + h + g2 + g3	3.6	μμf

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	300	volts
Plate dissipation	3.2	watts
Grid 2 dissipation	0.4	watt
Cathode current	13	ma

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	300	volts
Grid 3 (suppressor)*	connected to cathode at socket	
Grid 2 (screen) voltage	150	volts
Cathode bias resistor	160	ohms
Plate resistance (approx.)	0.5	meg
Transconductance	9000	μmhos
Plate current	10.0	ma
Grid 2 current	2.5	ma
Grid 1 voltage (approx.) for I_b = 10 μa	−7	volts

NOTE:

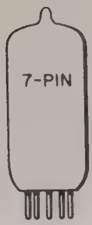
*Grid 3 has very limited control characteristics and is not intended to be used as a control electrode. Its transconductance to the plate is approximately 2 μmhos and its mu is 0.7 to 1.0.

6AH7GT • 6AJ4 • 6AJ5 • 6AJ7

(See chart for seldom-used tubes)

CBS

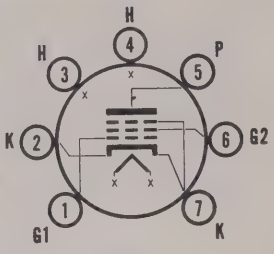
6AK5



R-f voltage amplifier for frequencies up to 400 mc

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	175	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	120	volts
Heater positive to cathode	120	volts



7BD

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p, max.	0.03	0.02	$\mu\mu$f
Input: g1 to k + h + g2 + g3	4.0	4.0	$\mu\mu$f
Output: p to k + h + g2 + g3	2.1	2.8	$\mu\mu$f

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	180	volts
Grid 2 voltage	140	volts
Grid 2 supply voltage	180	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	1.7	watts
Grid 2 dissipation	0.5	watt
Cathode current	18	ma

CHARACTERISTICS AND TYPICAL OPERATION

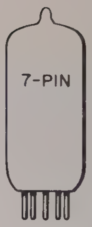
Class A Amplifier

Plate voltage	120	180	volts
Grid 3 (suppressor)	connected to cathode at socket		
Grid 2 (screen) voltage	120	120	volts
Cathode bias resistor*	180	180	ohms
Plate resistance (approx.)	0.3	0.5	meg
Transconductance	5000	5100	μmhos
Plate current	7.5	7.7	ma
Grid 2 current	2.5	2.4	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−8.5	−8.5	volts

NOTE:

*Fixed bias operation is not recommended.

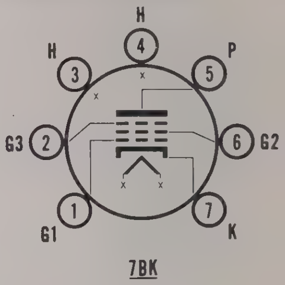
CBS 6AK6



Power output amplifier with low heater current

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	150	ma
Heater-cathode voltage, max. d-c		
Heater negative to cathode	100	volts
Heater positive to cathode	100	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.12	μμf
Input: g1 to k + h + g2 + b.p.	3.6	μμf
Output: p to k + h + g2 + b.p.	4.2	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	250	volts
Plate dissipation	2.75	watts
Grid 2 dissipation	.75	watt
Grid circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

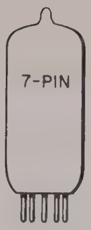
Class A Amplifier

Plate voltage	180	volts
Grid 2 (screen) voltage	180	volts
Grid 1 (control-grid) voltage	—9	volts
Grid 3 (suppressor)	connected to cathode at socket	
Plate resistance (approx.)	0.2	ohms
Transconductance	2300	μmhos
Grid 1 input voltage, peak a-f	9	volts
Plate current, zero signal	15	ma
Grid 2 current, zero signal	2.5	ma
Load resistance impedance	10,000	ohms
Total harmonic distortion (approx.)	10	%
Power output, maximum signal	1.1	watts

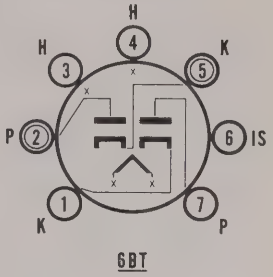
6AK7

(See chart for seldom-used tubes)

CBS 6AL5



A-m, f-m detector, or low-power rectifier



HEATER CHARACTERISTICS

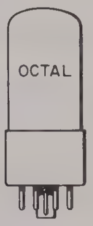
Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	330	volts
Heater positive to cathode	330	volts

Type 6AL5 is identical to type 3AL5 except for heater characteristics.

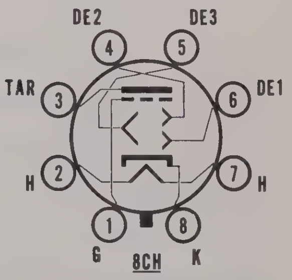
6AL6G

(See chart for seldom-used tubes)

CBS 6AL7GT



Tuning indicator controlled by f-m discriminator d-c output



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	150	ma
Peak heater-cathode voltage, max.	90	volts

MAXIMUM RATINGS (Design center values)

Target voltage, maximum	365	volts
Target voltage, minimum	220	volts

CHARACTERISTICS AND TYPICAL OPERATION

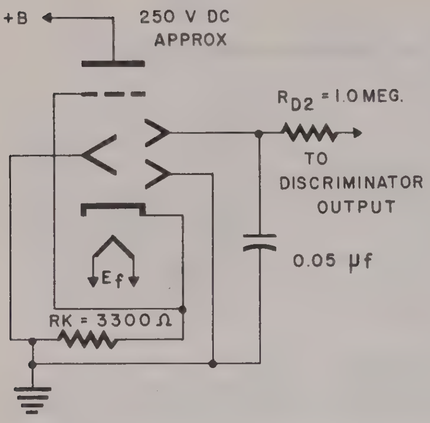
Target voltage	315	volts
Deflection electrodes 1, 2 & 3 voltage	0	volts
Grid voltage*	0	volts
Cathode bias resistor	3300	ohms
Deflection sensitivity (approx.) for first millimeter of deflection†	1.0	mm/volt
Grid voltage (approx.) for fluorescence cutoff	—7.0	volts

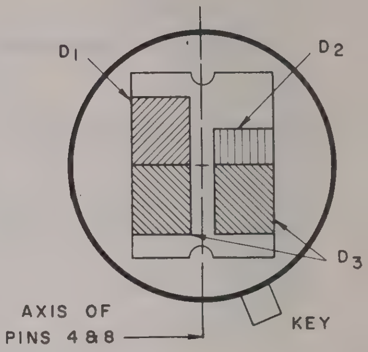
NOTES:

*Grid should be connected to cathode when not used for fluorescence control.

†For deflection electrodes 1 and 2.

TYPICAL FM TUNING INDICATOR


+B
250 V DC APPROX
R_{D2} = 1.0 MEG.
TO DISCRIMINATOR OUTPUT
0.05 µf
Ef
RK = 3300 Ω


D1
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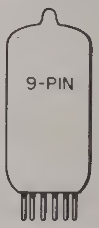
AXIS OF PINS 4 & 8
KEY

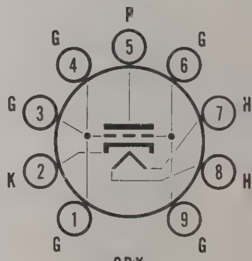
CBS 6AM4



Uhf grounded-grid mixer for television tuners

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	225	ma
Peak heater-cathode voltage, max.*	80	volts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9BX

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p	2.4	2.8	µµf
Input: g1 to k + h	4.4	4.6	µµf
Output: p to k + h	0.16	0.16	µµf

♦JETEC shield 315 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	200	volts
Control-grid voltage, positive d-c	0	volts
Plate dissipation	2.0	watts

CHARACTERISTICS AND TYPICAL OPERATION

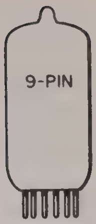
Plate voltage	200	volts
Cathode-bias resistor†	100	ohms
Plate resistance (approx.)	.0087	meg
Transconductance	9800	µmhos
Amplification factor	85	
Plate current	7.5	ma
Control-grid voltage (approx.) for $I_b = 10\ \mu a$	−6.5	volts

NOTES:

*When operated in series d-c with a second tube, heater-cathode voltage may be as high as 250 volts maximum under cutoff conditions when heater is negative to cathode.

†Operation with fixed bias not recommended.

CBS 6AM8

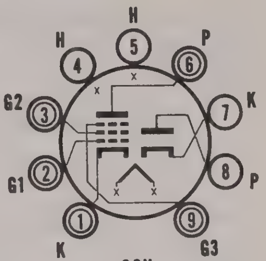


High-gain pentode i-f amplifier and high-perveance diode video detector

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



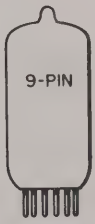
9CY

Type 6AM8 is identical to type 5AM8 except for heater characteristics.

6AN4 • 6AN5 • 6AN6

(See chart for seldom-used tubes)

CBS 6AN8

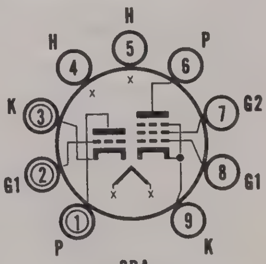


Combined sync clipper, sync separator, etc. and i-f or video amplifier for television receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



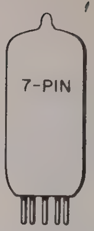
9DA

Type 6AN8 is identical to type 5AN8 except for heater characteristics.

CBS

6AQ5

6AQ5A

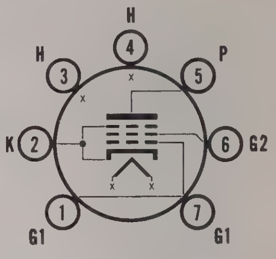


Audio power amplifier or TV vertical deflection amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



7BZ

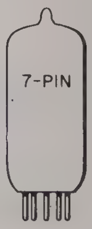
6AQ5A

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual)

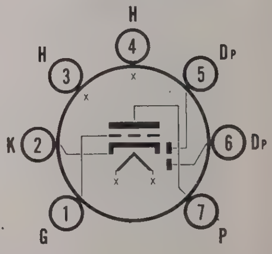
Types 6AQ5 and 6AQ5A are identical to type 5AQ5 except for heater characteristics.

CBS

6AQ6



Combined a-m detector, audio voltage amplifier, and avc tube



7BT

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	150	ma
Peak heater-cathode voltage, max.	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES♦

Triode Section

Grid to plate: g1 to p	1.8	μμf
Input: g1 to k + h	1.7	μμf
Output: p to k + h	1.5	μμf

♦With close fitting shield connected to cathode.

MAXIMUM RATINGS (Design center values)

Triode plate voltage	300	volts

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier (Triode Unit)

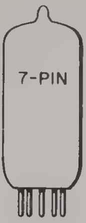
Plate voltage	100	250	volts
Grid 1 (control-grid) voltage	—1	—3	volts
Plate resistance (approx.)	61,000	58,000	ohms
Transconductance	1150	1200	μmhos
Amplification factor	70	70	
Plate current	0.8	1.0	ma

Diode Unit—Two diode plates are placed around a cathode, the sleeve of which is common to the triode unit. Diode biasing of the triode unit is not suitable.

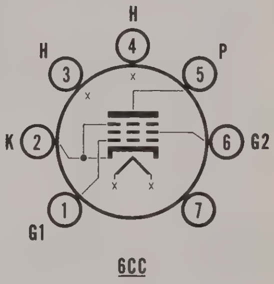
6AQ7GT

(See chart for seldom-used tubes)

CBS 6AR5



Power output audio amplifier having high efficiency



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	400	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Plate voltage	250	volts
Grid 2 voltage	250	volts
Plate dissipation	8.5	watts
Grid 2 dissipation	2.5	watts
Grid circuit resistance		
Fixed bias	0.1	meg
Cathode bias	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

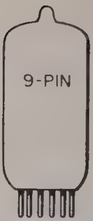
Plate voltage	250	250	volts
Grid 2 (screen) voltage	250	250	volts
Grid 1 (control-grid) voltage	−16.5	−18	volts
Plate resistance (approx.)	65,000	68,000	ohms
Transconductance	2400	2300	μmhos
Grid 1 input voltage, peak a-f	16.5	18	volts
Plate current, zero signal	34	32	ma
Plate current, maximum signal	35	33	ma
Grid 2 current, zero signal	5.7	5.6	ma
Grid 2 current, maximum signal	10	10	ma
Load resistance impedance	7000	7600	ohms
Total harmonic distortion (approx.)	7	11	%
Power output, maximum signal	3.2	3.4	watts

6AR6

(See chart for seldom-used tubes)

CBS

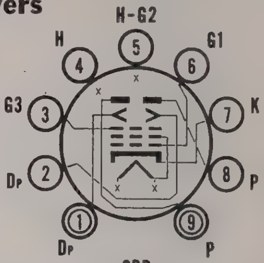
6AR8



Sheet beam tube used as synchronous detector in color television receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	0.3	amp



9DP

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Deflectors 1 and 2 to all, each deflector	4.8	μμf
Grid 1 to all except plates	7.5	μμf
Plates 1 and 2 to all, each plate	5.0	μμf
Grid 1 to deflector 1, max.	0.040	μμf
Grid 1 to deflector 2, max.	0.060	μμf
Plate 1 to plate 2	0.4	μμf
Deflector 1 to deflector 2	0.38	μμf

MAXIMUM RATINGS (Design center values)

Plate 1 and plate 2 voltage	300	volts
Accelerator voltage	300	volts
Deflectors 1 and 2 voltage, peak positive	150	volts
Deflectors 1 and 2 voltage, peak negative	150	volts
Grid 1 voltage, positive d-c	0	volts
Plates 1 and 2 dissipation, each plate	2.0	watts
Cathode current, d-c	30	ma
Grid 1 circuit resistance		
Fixed bias	0.1	meg
Self bias	0.25	meg

CHARACTERISTICS

Deflectors Grounded

Plates 1 and 2 voltage, connected together	250	volts
Accelerator voltage	250	volts
Deflectors 1 and 2 voltage	0	volts
Cathode-bias resistor	300	ohms
Plate current, total	10	ma
Accelerator current	0.4	ma
Grid 1 transconductance	4000	μmhos
Grid 1 voltage (approx.) for $I_b = 10$ μa	−14	volts

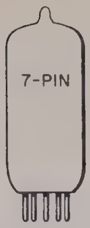
Deflectors Not Grounded

Plates 1 and 2 voltage	250	volts
Accelerator voltage	250	volts
Cathode bias resistor	300	ohms
Deflector switching voltage, maximum*	20	volts
Deflector bias voltage for min. deflector switching voltage*	−8	volts
Voltage difference between deflectors when $Ib_1 = Ib_2$ (approx.)	0	volts
Plate 1 current, max. with $Ed_1 = -15V$, $Ed_2 = +15V$	1.0	ma
Plate 2 current, max. with $Ed_1 = +15V$, $Ed_2 = -15V$	1.0	ma
Deflector 1 current, max. with $Ed_1 = +25V$, $Ed_2 = -25V$	0.5	ma
Deflector 2 current, max. with $Ed_1 = -25V$, $Ed_2 = +25V$	0.5	ma

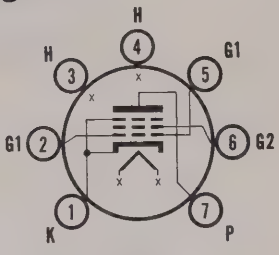
NOTE:

*Deflector switching voltage is the total voltage change on either deflector with an equal and opposite change on the other deflector required to switch the plate current from one plate to another.

CBS 6AS5



Audio power output amplifier giving high output at low B supply voltage



7CV

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	800	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.6	μμf
Input: g1 to k + h + g2 + b.p	12	μμf
Output: p to k + h + g2 + b.p	6.2	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	150	volts
Grid 2 voltage	117	volts
Plate dissipation	5.5	watts
Grid 2 dissipation	1.0	watt
Grid 1 circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

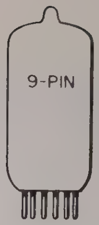
Class A Amplifier

Plate voltage	150	volts
Grid 2 (screen) voltage	110	volts
Grid 1 (control-grid) voltage	—8.5	volts
Transconductance	5600	μmhos
Grid 1 input voltage, peak a-f	8.5	volts
Plate current, zero signal	35	ma
Plate current, maximum signal	36	ma
Grid 2 current, zero signal	2.0	ma
Grid 2 current, maximum signal	6.5	ma
Load resistance impedance	4500	ohms
Total harmonic distortion (approx.)	10	%
Power output, maximum signal	2.2	watts

6AS6 • 6AS7G

(See chart for seldom-used tubes)

CBS 6AS8

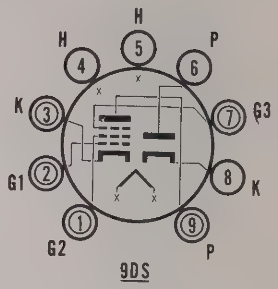


Combined high gain i-f, video, or agc amplifier and video detector

HEATER CHARACTERISTICS

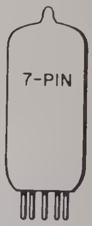
Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



Type 6AS8 is identical to type 5AS8 except for heater characteristics.

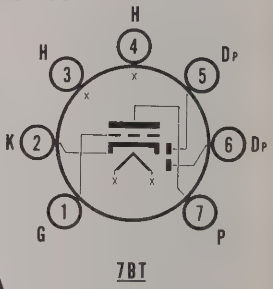
CBS 6AT6



Combined a-m detector, audio voltage amplifier and avc tube

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section	No Shield	Shield⧫	
Grid to plate: g1 to p	2.2	2.0	μμf
Input: g1 to k + h	2.2	2.2	μμf
Output: p to k + h	0.8	1.2	μμf
Diode 2 plate to triode grid	0.04	0.04	μμf

⧫JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

Class A Amplifier	Triode	
Plate voltage	300	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	0.5	watt

CHARACTERISTICS AND TYPICAL OPERATION

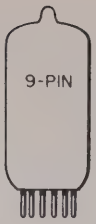
Class A Amplifier	Triode Unit		
Plate voltage	100	250	volts
Grid 1 (control-grid) voltage	—1	—3	volts
Plate resistance (approx.)	.0054	.0058	meg
Transconductance	1300	1200	μmhos
Amplification factor	70	70	
Plate current	0.8	1.0	ma
Plate current (each diode)*		1.0	ma

NOTE:

*Diode biasing of the triode section of the 6AT6 is not suitable.

6AT8

6AT8A

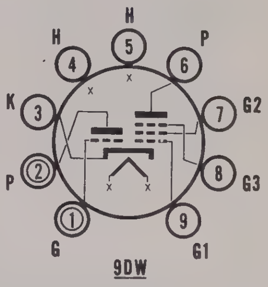


Combined vhf oscillator and mixer for television or a-m/f-m receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode★	100	volts

★D-c component must not exceed 100 volts max.



6AT8A

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

Types 6AT8 and 6AT8A are identical to type 5AT8 except for heater characteristics.

6AU4GT

6AU4GTA

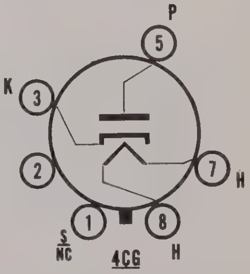
TV damper diode in the horizontal deflection circuit of television receivers

HEATER CHARACTERISTICS

Voltage	6.3	volts
Current	1.8	amp
Peak heater-cathode voltage, max.*		
Heater negative to cathode†♦	4500	volts
Heater positive to cathode★	300	volts

♦D-c component must not exceed 900 volts max,

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Heater to cathode: h to k, max.	4.0	μμf
Cathode to plate-and-heater: k to p + h	11.5	μμf
Plate to cathode-and-heater: p to k + h	8.5	μμf

MAXIMUM RATINGS (Design center values unless noted)

TV Damper Service*	6AU4GT	6AU4GTA	
Plate voltage, peak inverse†	4500	4500	volts
Plate current, d-c	175	190	ma
Plate current, peak	1050	1150	ma
Plate dissipation	6.0	6.0	watts

AVERAGE CHARACTERISTICS

Tube voltage drop at Ib = 350 ma	25	volts

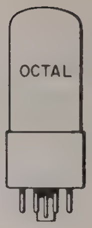
NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

†Absolute maximum value.

CBS

6AU5GT

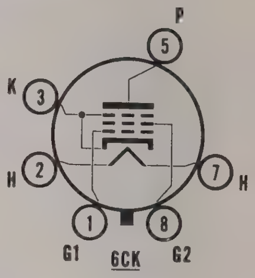


Horizontal deflection amplifier used in high-efficiency TV sweep circuits

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.25	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.5	μμf
Input: g1 to k + h + g2 + b.p	11.3	μμf
Output: p to k + h + g2 + b.p	7.0	μμf

MAXIMUM RATINGS (Design center values unless noted)

Horizontal Deflection Amplifier*

Plate supply voltage, d-c (boost + d-c power supply)	550	volts
Plate voltage, peak pos. (absolute max.)	5500	volts
Plate voltage, peak negative pulse	—1250	volts
Grid 2 voltage, d-c†	200	volts
Grid 1 voltage, peak negative	—300	volts
Plate dissipation‡	10	watts
Grid 2 dissipation	2.5	watts
Cathode current, average	110	ma
Cathode current, peak	400	ma
Grid 1 circuit resistance	0.47	meg
Bulb temperature at hottest point▲	210	°C

AVERAGE CHARACTERISTICS

	Instantaneous values			
Plate voltage	60	100	115	volts
Grid 2 (screen) voltage	175	100	175	volts
Grid 1 (control-grid) voltage	0	—4.5	—20	volts
Transconductance			5600	μmhos
Plate current	210			ma
Grid 2 current	25			ma
Amplification factor		5.9		

NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

†Preferably obtained from a series dropping resistor of sufficient value to limit grid 2 input to rated maximum.

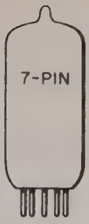
‡Tube protection is needed for no-drive conditions if grid-resistor bias is used.

▲In vertical position, base down, and in free space with natural ventilation, hottest point is center of dome just above open end of cathode sleeve.

CBS

6AU6

6AU6A

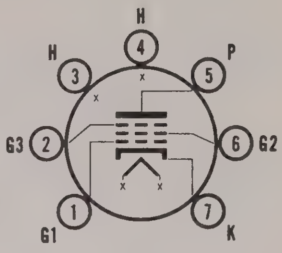


R-f amplifier, i-f amplifier, f-m limiter, or audio voltage amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c		6.3	volts
Current		300	ma
Peak heater-cathode voltage, max.			
Heater negative	**6AU6A**	**6AU6**	
to cathode	200	180	volts
Heater positive			
to cathode★	200	100	volts

★D-c component must not exceed 100 volts max.



7BK

6AU6A

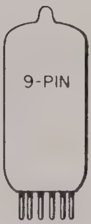
Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

Types 6AU6 and 6AU6A are identical to types 3AU6 and 4AU6 except for heater ratings.

CBS

6AU8

6AU8A

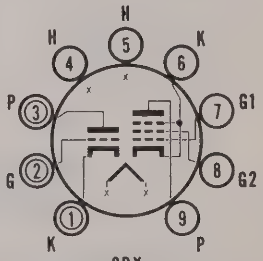


Combined sync amplifier, separator, or clipper, etc., and video or i-f amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).



9DX

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	6AU8	6AU8A	
Triode Section			
Grid to plate: g1 to p	2.2	2.2	μμf
Input: g1 to k + h	2.6	2.6	μμf
Output: p to k + h	0.34	0.34	μμf
Pentode Section			
Grid to plate: g1 to p	0.044	0.06	μμf
Input: g1 to k + h + g2 + g3	7.5	7.5	μμf
Output: p to k + h + g2 + g3	2.4	3.4	μμf
Coupling: pentode grid 1 to triode plate, max.	0.006	0.006	μμf
Coupling: pentode plate to triode grid, max.	0.022	0.022	μμf
Coupling: pentode plate to triode plate, max.	0.12	0.12	μμf

6AU8 • 6AU8A (cont.)

MAXIMUM RATINGS (Design center values)

	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.5	3.0	watts
Grid 2 dissipation		1.0	watt
Grid 1 circuit resistance			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

	Triode	Pentode	
Plate voltage	150	200	volts
Grid 2 (screen) voltage		125	volts
Cathode-bias resistor	150	82	ohms
Plate resistance (approx.)	8200	150,000	ohms
Transconductance	4900	7000	μmhos
Amplification factor	40		
Plate current	9.0	15	ma
Screen current		3.4	ma
Grid 1 voltage (approx.) for $I_b = 100\ \mu a$	−6.5	−8	volts

6AU8A†

Zero bias: with $E_b = 40V$, $E_{c2} = 125V$ (instantaneous values)

Plate current	30	ma
Grid 2 current	10	ma

NOTE:

†Type 6AU8A features a controlled plate knee characteristic.

CBS

6AV5GA

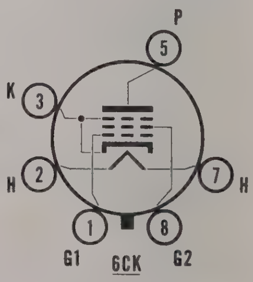
6AV5GT

Horizontal deflection amplifier for television receiver sweep circuits

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.2	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	6AV5GA	6AV5GT	
Grid to plate: g1 to p	0.5	0.7	μμf
Input: g1 to k + h + g2 + b.p.	14	14	μμf
Output: p to k + h + g2 + b.p.	7.0	7.0	μμf

6AV5GA • 6AV5GT (cont.)

MAXIMUM RATINGS (Design center values unless noted)

Horizontal Deflection Amplifier*

Plate supply voltage, d-c (boost + d-c power supply)	550	volts
Plate voltage, peak pos. (absolute max.)	5500	volts
Plate voltage, peak negative pulse	1250	volts
Grid 2 voltage, d-c	175	volts
Grid 1 voltage, peak negative	300	volts
Plate dissipation†	11	watts
Grid 2 dissipation	2.5	watts
Cathode current, average	110	ma
Cathode current, peak	400	ma
Grid 1 circuit resistance	0.47	meg
Bulb temperature at hottest point	210	°C

AVERAGE CHARACTERISTICS

	Instantaneous values		
Plate voltage	60	250	volts
Grid 2 (screen) voltage	150▲	150	volts
Grid 1 (control-grid) voltage	0	—22.5	volts
Plate resistance (approx.)		14,500	ohms
Transconductance		5900	μmhos
Plate current	260	57	ma
Grid 2 current	26	2.1	ma
Grid 1 voltage (approx.) for $I_b = 1.0$ ma		—43	volts

Triode Connected

Plate and grid 2 voltage (p + g2 tied together)	150	volts
Grid 1 voltage	—22.5	volts
Amplification factor	4.3	

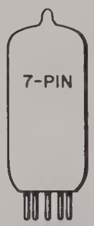
NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

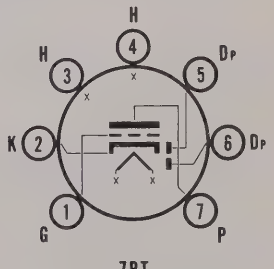
†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

▲Applied for a two second maximum so as not to injure tube.

CBS 6AV6



Combined a-m detector, avc, and audio voltage amplifier for radio receivers



7BT

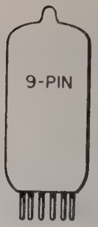
HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

Type 6AV6 is identical to type 3AV6 except for heater ratings and heater-cathode voltage ratings.

CBS

6AW8



6AW8A

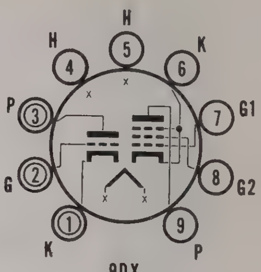
Combined sync separator and video amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



9DX

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section—6AW8 and 6AW8A	No Shield	Shield♦	
Grid to plate: g1 to p	2.2	2.2	μμf
Input: g1 to k + h	3.2	3.4	μμf
Output: p to k + h	0.32	1.7	μμf
Pentode Section—6AW8			
Grid to plate: g1 to p, max.	0.036	0.030	μμf
Input: g1 to k + h + g2 + g3 + i.s.	11.0	11.0	μμf
Output: p to k + h + g2 + g3 + i.s.	2.8	3.6	μμf
Coupling: pentode grid 1 to triode plate, max.	0.008	0.005	μμf
Coupling: pentode plate to triode grid, max.	0.030	0.008	μμf
Coupling: pentode plate to triode plate, max.	0.20	0.05	μμf
Pentode Section—6AW8A			
Grid to plate: g1 to p	0.04	0.03	μμf
Input: g1 to k + h + g2 + g3 + i.s.	10.0	10.0	μμf
Output: p to h + k + g2 + g3 + i.s.	3.6	4.5	μμf
Coupling: pentode grid 1 to triode plate	0.006	0.003	μμf
Coupling: pentode plate to triode grid	0.016	0.006	μμf
Coupling: pentode plate to triode plate	0.150	0.023	μμf

♦JETEC shield 315 connected to cathode.

MAXIMUM RATINGS (Design center values)

	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c		0	volts
Grid 1 voltage, negative d-c		50	volts
Plate dissipation	1.0	3.25	watts
Grid 2 dissipation		1.0	watt
Grid 1 circuit resistance			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

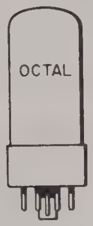
6AW8 • 6AW8A (cont.)

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	**Triode**	**Pentode**	
Plate voltage	200	200	volts
Grid 2 (screen) voltage		150	volts
Grid 1 (control-grid) voltage	−2	0	volts
Cathode-bias resistor		180	ohms
Plate resistance (approx.)	.0175	0.4	meg
Transconductance	4000	9000	μmhos
Amplification factor	70		
Plate current	4.0	13	ma
Grid 2 current		3.5	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−5	−10	volts

6AW8A—Instantaneous Values	**Pentode**	
Plate voltage	65	volts
Grid 2 voltage	150	volts
Grid 1 voltage	0	volts
Plate current	42	ma
Grid 2 current	12.5	ma

6AX4GT



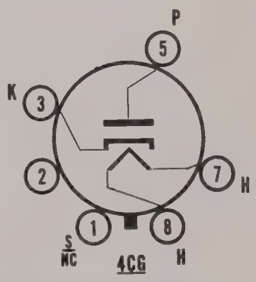
Damper diode for television horizontal sweep circuits

HEATER CHARACTERISTICS

Voltage	6.3	volts
Current	1.2	amp
Peak heater-cathode voltage, max.*		
Heater negative to cathode†♦	4400	volts
Heater positive to cathode★	300	volts

♦D-c component must not exceed 900 volts max.

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Heater to cathode: h to k, max.	4.0	μμf
Cathode to plate-and-heater: k to p + h	8.5	μμf
Plate to cathode-and-heater: p to k + h	5.0	μμf

MAXIMUM RATINGS (Design center values unless noted)

TV Damper Service*		
Plate voltage, peak inverse†	4400	volts
Plate current, d-c	125	ma
Plate current, peak	750	ma
Plate dissipation	4.8	watts

AVERAGE CHARACTERISTICS

Tube voltage drop at 250 ma	32	volts

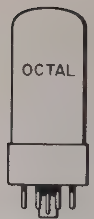
NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

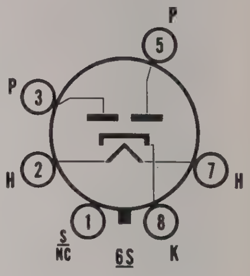
†Absolute maximum value.

CBS

6AX5GT



Full-wave power rectifier for moderate current requirements



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.2	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	450	volts
Heater positive to cathode	450	volts

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Rectifier Service

Plate voltage, peak inverse	1250	volts
Plate current, peak steady state (each plate)	375	amp
Plate current, hot-switching transient (for 0.2 sec. max.)	2.6	amp

TYPICAL OPERATION

Full-Wave Rectifier (Capacitor Input Filter)

Plate supply voltage, rms (each plate)	350	450	volts
Plate supply impedance (each plate)	50	105	ohms
Filter input capacitor†	10	10	μf
Output voltage at filter input, d-c			
At half-load current of 62.5 ma	395		volts
40.0 ma		540	volts
At full-load current of 125 ma	350		volts
80 ma		490	volts
Voltage regulation (approx.)			
Half-load to full-load current	45	50	volts

Full-Wave Rectifier (Choke Input Filter)

Plate supply voltage, rms (each plate)	700	900	volts
Filter input choke	10	10	henrys
Output voltage at filter input, d-c			
At half-load current of 75 ma	270		volts
62.5 ma		365	volts
At full-load current of 150 ma	250		volts
125 ma		350	volts
Voltage regulation (approx.)			
Half-load to full-load current	20	15	volts

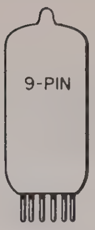
NOTES:

†Higher values may be used but the effective plate supply impedance may have to be increased to prevent exceeding the maximum rating for hot-switching transient plate current.

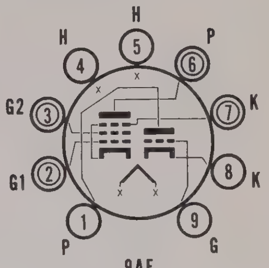
6AX6G

(See chart for seldom-used tubes)

CBS 6AX8



Combined sync separator and video amplifier for TV receivers



9AE

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section	Shield♦	
Grid to plate: g1 to p	1.8	μμf
Input: g1 to k + h	2.5	μμf
Output: p to k + h	1.0	μμf
Cathode to heater: k to h (approx.)	3.5	μμf

Pentode Section		
Grid to plate: g1 to p	0.006	μμf
Input: g1 to k + h + g2 + g3	5.0	μμf
Output: p to k + h + g2 + g3	3.5	μμf
Cathode to heater: k to h (approx.)	3.5	μμf

♦JETEC shield 315 connected to cathode.

MAXIMUM RATINGS (Design center values)

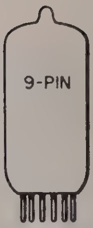
	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.7	2.8	watts
Grid 2 dissipation		0.5	watts

CHARACTERISTICS AND TYPICAL OPERATION

	Triode	Pentode	
Plate voltage	150	250	volts
Grid 2 (screen) voltage		110	volts
Cathode-bias resistor	56	120	ohms
Plate resistance (approx.)	.005	0.40	meg
Transconductance	8500	4800	μmhos
Amplification factor	40		
Plate current	18	10	ma
Grid 2 current		3.5	ma
Grid 1 voltage (approx.) for $I_b = 10$ μa	—12	—12	volts

CBS

6AZ8

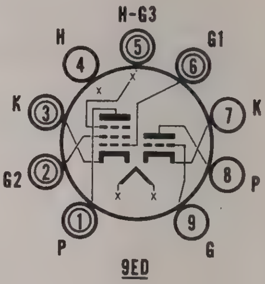


Triode sync separator, sync clipper, phase splitter, pentode i-f video amplifier, agc amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.†		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

Grid to plate: g1 to p	1.7	μμf
Input: g1 to k + h + i.s.	2	μμf
Output: p to k + h + i.s.	1.7	μμf

Pentode Section

Grid to plate: g1 to p, max.	0.02	μμf
Input: g1 to k + h + g2 + g3 + i.s.	6.5	μμf
Output: p to k + h + g2 + g3 + i.s.	2.2	μμf
Coupling: pentode grid 1 to triode plate, max.	0.020	μμf
Coupling: pentode plate to triode grid, max.	0.027	μμf
Coupling: pentode plate to triode plate, max.	0.045	μμf

MAXIMUM RATINGS (Design center values)

Class A Amplifier	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.6	2	watts
Grid 2 dissipation, up to 150 volts		0.5	watt
Grid 2 dissipation, between 150 and 300 volts	See Rating Chart in APPENDIX		
Grid 1 circuit resistance‡			
Fixed bias	0.5	0.25	meg
Cathode bias	1.0	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Triode	Pentode	
Plate supply voltage	200	200	volts
Grid 2 (screen) supply voltage		150	volts
Grid 1 (control-grid) voltage	−6		volts
Cathode-bias resistor		180	ohms
Plate resistance (approx.)	5750	300,000	ohms
Transconductance	3300	6000	μmhos
Amplification factor	19		
Plate current	13	9.5	ma
Grid 2 current		3	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−19		volts
Grid 1 voltage (approx.) for $g_m = 100\ \mu mhos$		−12.5	volts

NOTES:

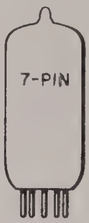
†Pentode heater-cathode voltage should not exceed value of operating cathode bias because grid 3 is connected to heater, thus grid 3 could be negative with respect to cathode with possible change in tube characteristics.

‡If either unit is operated at maximum rated conditions, grid 1 circuit resistance for both units should not exceed the stated values.

6B4G • 6B5 • 6B6G • 6B7 • 6B8 • 6B8G/GT

(See chart for seldom-used tubes)

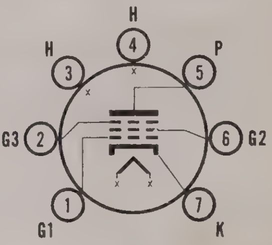
6BA6



Pentode amplifier for gain controlled r-f or i-f stages

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



7CC

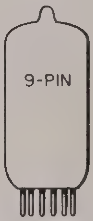
Type 6BA6 is identical to type 3BA6 except for heater characteristics.

6BA7

(See chart for seldom-used tubes)

6BA8

6BA8A



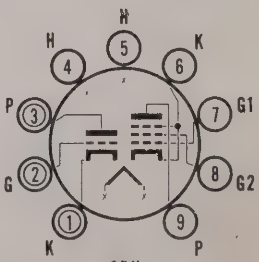
Combined sync separator or sync clipper, etc. and video amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



9DX

6BA8 • 6BA8A (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	6BA8		6BA8A		
Triode Section	**Shield♦**	**No Shield**	**Shield♦**	**No Shield**	
Grid to plate: g1 to p	2.2	2.2	2.2	2.2	μμf
Input: g1 to k + h	2.7	2.5	2.7	2.5	μμf
Output: p to k + h	1.9	0.4	1.9	0.4	μμf
Pentode Section					
Grid to plate: g1 to p	.030m	.036m	.03	.04	μμf
Input:					
g1 to k + h + g2 + g3 + i.s.	9.5	9.5	10.0	10.0	μμf
Output:					
p to k + h + g2 + g3 + i.s.	3.6	2.8	4.5	3.6	μμf
Coupling					
Pentode grid 1 to triode plate	.005m	.010m	.003	.006	μμf
Pentode plate to triode grid	.012m	.022m	.006	.016	μμf
Pentode plate to triode plate	.050m	0.20m	.023	.150	μμf

♦JETEC shield 315 connected to cathode of section tested.

M=Maximum value.

MAXIMUM RATINGS (Design center values)

	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c		0	volts
Grid 1 voltage, negative d-c		50	volts
Plate dissipation	2.0	3.25	watts
Grid 2 dissipation		1.0	watts
Grid 1 circuit resistance			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Triode	Pentode	
Plate voltage	200	200	volts
Grid 2 (screen) voltage		150	volts
Grid 1 (control-grid) voltage	−8	0	volts
Cathode-bias resistor		180	ohms
Plate resistance (approx.)	6700	400,000	ohms
Transconductance	2700	9000	μmhos
Amplification factor	18		
Plate current	8.0	13	ma
Grid 2 current		3.5	ma
Grid 1 voltage (approx.) for $I_b = 10$ μa	−16	−10	volts

6BA8A†

Zero bias: with $E_b = 65V$, $E_{c2} = 150V$ (instantaneous values)

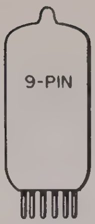
Plate current	42	ma
Grid 2 current	12.5	ma

NOTE:

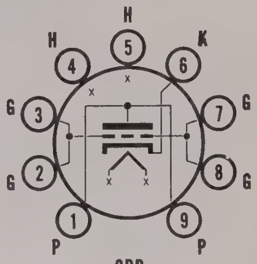
†Type 6BA8A features a controlled plate knee characteristic.

CBS

6BC4



Uhf amplifier for cathode drive circuits



9DR

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	225	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	75	volts
Heater positive to cathode	75	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	1.6	μμf
Input: g1 to k + h	2.9	μμf
Output: p to k + h	0.26	μμf
Heater to cathode: h to k	2.7	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	250	volts
Plate dissipation	2.5	watts
Cathode current	25	ma
Control-grid circuit resistance		
Fixed bias	not recommended	
Self bias	0.5	meg

CHARACTERISTICS

Class A Amplifier

Plate supply voltage	150	volts
Cathode-bias resistor	100	ohms
Plate resistance (approx.)	4800	ohms
Transconductance	10,000	μmhos
Amplification factor	48	
Plate current	14.5	ma
Control-grid voltage (approx.) for $I_b = 10\ \mu a$	−10	volts

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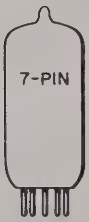
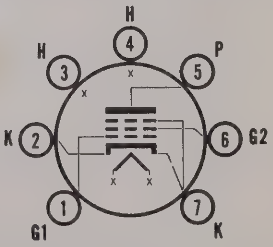
CBS

6BC5



R-f or i-f amplifier capable of high frequency operation



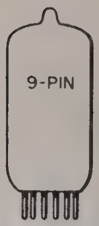
7BD

HEATER CHARACTERISTICS

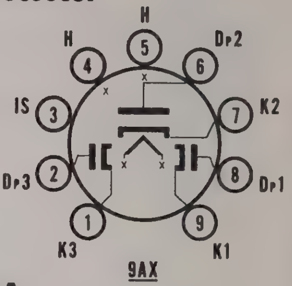
Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

Type 6BC5 is identical to type 3BC5 except for heater ratings.

CBS 6BC7



D-c restorer for tricolor TV or combined f-m discriminator and a-m detector



HEATER CHARACTERISTICS

Voltage	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode	200	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Plate Diode 1 to all other elements	3.5	μμf
Plate Diode 2 to all other elements	5.5	μμf
Plate Diode 3 to all other elements	3.5	μμf

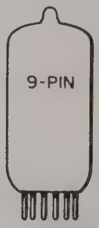
MAXIMUM RATINGS (Design center values, each section)

Plate voltage, peak inverse	330	volts
Plate current, d-c	12	ma
Plate current, peak	54	ma

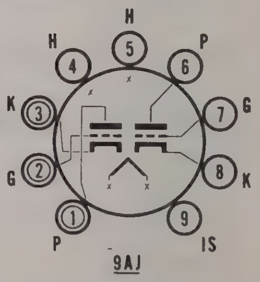
AVERAGE CHARACTERISTICS

Plate current, $E_b = 5$ volts, $R_L = 0\ \Omega$		
Diode 1, 2 and 3	35	ma
Plate current, $E_b = 0$ volts, $R_L = 40{,}000\ \Omega$		
Diode 1, 2 and 3	21	μa
Plate current ratio, $E_b = 5$ volts, $R_L = 40{,}000\ \Omega$		
Diode 1/Diode 3	1.3	max
Diode 3/Diode 1	1.3	max

CBS 6BC8



Gain-controlled very-high-frequency cascode amplifier for TV tuners



HEATER CHARACTERISTICS

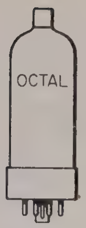
Voltage, a-c or d-c	6.3	volts
Current	400	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode*	200	volts
Heater positive to cathode★	200	volts

*D-c component must not exceed 100 volts.

★This rating may be as high as 300 volts under cutoff conditions when the tube is used as a cascode amplifier and the two sections are connected in series.

Type 6BC8 is identical to type 4BC8 except for heater characteristics.

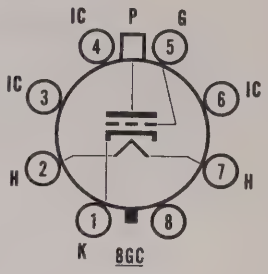
6BD4A



High-voltage regulator for color TV picture tube anode supplies

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	200	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	180	volts
Heater positive to cathode	180	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.03	μμf
Input: g1 to k + h	2.6	μμf
Output: p to k + h	1.0	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage, d-c	25,000	volts
Plate supply voltage, unregulated d-c	55,000	volts
Grid voltage, d-c	−125	volts
Grid voltage, peak	−550	volts
Plate current	1.5	ma
Plate dissipation	25	watts
Grid circuit resistance		
With unregulated supply resistance of at least 8 meg.	4	meg

TYPICAL OPERATION

Shunt Regulator

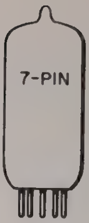
Unregulated supply voltage with 8 meg. equivalent resistance	29,800	volts
Reference supply voltage with 1K equivalent resistance	500	volts
Transconductance, effective grid to plate	138	μmhos
Plate current at 0 ma load, d-c	1,055	μa
Plate current at 1 ma load, d-c	100	μa
Regulated output voltage at 0 ma load, d-c	20,000	volts
Regulated output voltage at 1 ma load, d-c	19,700	volts

6BD5GT

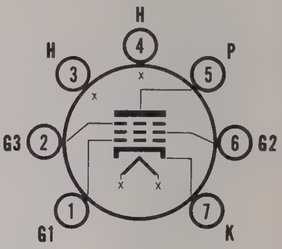
(See chart for seldom-used tubes)

CBS

6BD6



Gain controlled radio-frequency or intermediate-frequency amplifier for radio receivers



7BK

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p, max.	0.005	0.004	μμf
Input: g1 to k + h + g2 + g3 + i.s.	4.3	4.3	μμf
Output: p to k + h + g2 + g3 + i.s.	5.0	5.0	μμf

♦JETEC shield 316 connected to cathode

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	125	volts
Plate dissipation	3.0	watts
Grid 2 dissipation	0.65	watt
Cathode current	14	ma

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	100	125	250	volts
Grid 3 (suppressor)	connected to cathode at socket			
Grid 2 (screen) voltage	100	125	100	volts
Grid 1 (control-grid) voltage	−1	−3	−3	volts
Plate resistance (approx.)	0.15	0.18	0.8	meg
Transconductance	2550	2350	2000	μmhos
Plate current	13	13	9	ma
Grid 2 current	5	5	3	ma
Grid 1 voltage (approx.) for $g_m = 10$ μmhos	−35	−45	−35	volts

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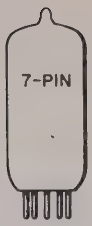
6BD7

(See chart for seldom-used tubes)

CBS

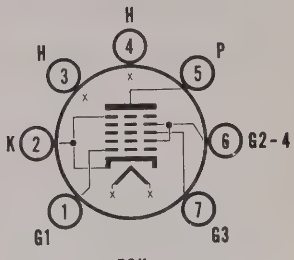
6BE6



Radio-frequency converter in superheterodyne radio receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



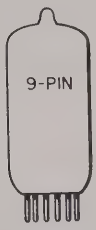
7CH

Type 6BE6 is identical to type 3BE6 except for heater ratings.

CBS

6BE8

6BE8A



Vhf triode oscillator—pentode mixer for television tuners

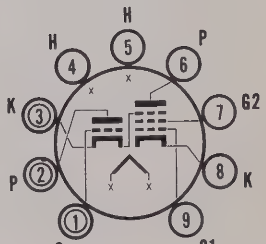
HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.

6BE8A

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

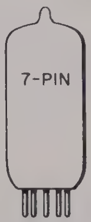


9EG

Types 6BE8 and 6BE8A are identical to type 5BE8 except for heater characteristics.

CBS

6BF5

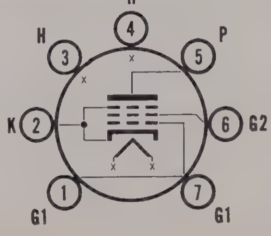


Audio power amplifier or TV vertical deflection amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.2	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



7BZ

6BF5 (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES		Triode Connected	
Grid to plate: g1 to p	0.65	7.5	μμf
Input: g1 to k + h + g2 + b.p.	14	7	μμf
Output: p to k + h + g2 + b.p.	6	6	μμf

MAXIMUM RATINGS (Design center values unless noted)

	Class A Amplifier	Vertical Deflection Triode Connected*	
Plate voltage, d-c	250	250	volts
Plate voltage, peak pos. (absolute max.)		900	volts
Plate dissipation	5.5	5.0†	watts
Grid 2 dissipation	1.25		watts
Grid 2 voltage	117	250	volts
Grid 1 voltage, peak negative		—250	volts
Cathode current, average		40	ma
Cathode current, peak		120	ma
Control-grid circuit resistance		2.2	meg

AVERAGE CHARACTERISTICS AND TYPICAL OPERATION

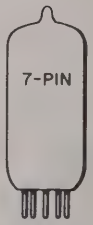
	Triode Connected	Class A Amplifier	
Plate voltage	225	110	volts
Grid 2 voltage	225	110	volts
Grid 1 voltage	—30	—7.5	volts
Grid 1 voltage, peak a-f		7.5	volts
Plate current, zero signal	10	36.0	ma
Plate current, max. signal		39.0	ma
Grid 2 current, zero signal		4.0	ma
Grid 2 current, max. signal		10.5	ma
Plate resistance	2500	12,000	ohms
Transconductance	2700	7500	μmhos
Load resistance		2500	ohms
Power output, max. signal		1.9	watts
Total harmonic distortion (approx.)		10	%
Amplification factor	6.7		
Grid voltage (approx.) for $I_b = 0.5$ ma	—40		volts

NOTES:

*Voltage pulse duration must not exceed 2500 μs in a 525-line 30-frame system.

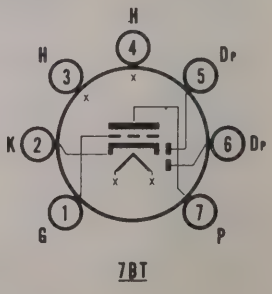
†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

CBS 6BF6



Combined detector, avc, and audio driver tube in automobile radio receivers

HEATER CHARACTERISTICS		
Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



6BF6 (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section	Shield♦	No Shield	
Grid to plate: g1 to p, max.	2.0	2.0	μμf
Input: g1 to k + h	1.8	1.8	μμf
Output: p to k + h	1.1	0.8	μμf
Diode 1 plate to cathode	1.4	0.7	μμf
Diode 2 plate to cathode	1.5	0.1	μμf
Diode 1 plate to triode grid, max.	0.06	0.07	μμf
Diode 2 plate to triode grid, max.	0.05	0.06	μμf

♦JETEC shield 316 connected to cathode

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Plate dissipation	2.5	watts
Plate current (for each diode)	1.0	ma

TYPICAL OPERATION

Class A Amplifier with transformer coupling

Plate voltage	250	volts
Grid 1 (control-grid) voltage*	−9	volts
Load resistance	10,000	ohms
Plate resistance (approx.)	8500	ohms
Transconductance	1900	μmhos
Amplification factor	16	
Plate current	9.5	ma
Power output	300	mw
Total harmonic distortion	6.5	%
Diode current with 10 volts d-c applied (each plate)	0.8	ma

NOTES:

*Diode biasing of the triode is not suitable.

6BF7

(See chart for seldom-used tubes)

6BG6G

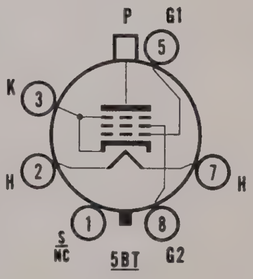
6BG6GA

Horizontal deflection amplifier for television receiver sweep circuits

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	0.9	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



6BG6G • 6BG6GA (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.34	μμf
Input: g1 to k + h + g2 + b.p	12	μμf
Output: p to k + h + g2 + b.p	6.5	μμf

MAXIMUM RATINGS (Design center values unless noted)

Horizontal Deflection Amplifier*

Plate supply voltage, d-c (boost + d-c power supply)	700	volts
Plate voltage, peak pos. (absolute max.)	6600	volts
Plate voltage, peak negative pulse	1500	volts
Grid 2 voltage, d-c	350	volts
Grid 1 voltage	—50	volts
Grid 1 voltage, peak negative	300	volts
Plate dissipation†	20	watts
Grid 2 dissipation	3.2	watts
Cathode current, average	110	ma
Cathode current, peak	400	ma
Grid 1 circuit resistance	0.47	meg
Bulb temperature at hottest point	210	°C

AVERAGE CHARACTERISTICS	Instantaneous values		
Plate voltage	60	250	volts
Grid 2 (screen) voltage	250	250	volts
Grid 1 (control-grid) voltage	0	—15	volts
Plate resistance (approx.)		25,000	ohms
Transconductance		6000	μmhos
Plate current	180	75	ma
Grid 2 current	18	4.0	ma
Grid 1 voltage (approx.) for $I_b = 1$ ma		—45	volts
Triode amplification factor (p + g2 tied together)		8	

NOTES:

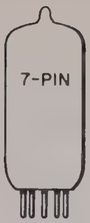
*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

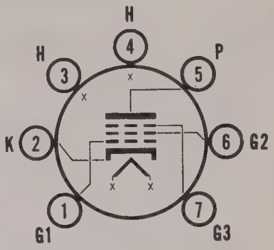
6BG7

(See chart for seldom-used tubes)

CBS 6BH6



Radio frequency amplifier for equipment in which low heater current is important



7CM

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p, max.	0.0035	0.0035	μμf
Input: g1 to k + h + g2 + g3 + i.s.	5.4	5.4	μμf
Output: p to k + h + g2 + g3 + i.s.	4.4	4.4	μμf

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

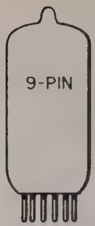
Plate voltage	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	300	volts
Grid 1 voltage, negative d-c	50	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	3.0	watts
Grid 2 dissipation		
For grid 2 voltages up to 150 volts	0.5	watt
For grid 2 voltages between 150 and 300 volts	See Rating Chart in APPENDIX	

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	100	250	volts
Grid 3 (suppressor)	connected to cathode at socket		
Grid 2 (screen) voltage	100	150	volts
Grid 1 (control-grid) voltage	−1	−1	volts
Plate resistance (approx.)	0.7	1.4	meg
Transconductance	3400	4600	μmhos
Plate current	3.6	7.4	ma
Grid 2 current	1.4	2.9	ma
Grid 1 voltage (approx.) for $I_b = 10$ μa	−5	−7.7	volts

CBS 6BH8

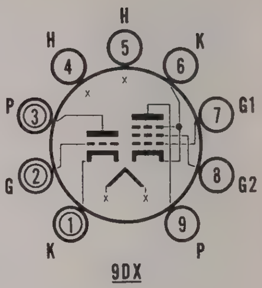


Combined sync separator, clipper, amplifier or sweep oscillator and i-f or video amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c........... 6.3 volts
Current..................... 600 ma
Peak heater-cathode voltage, max.
  Heater negative to cathode................. 200 volts
  Heater positive to cathode★.............. 200 volts
Warm-up time...... 11 secs. average
  (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

Grid to plate: g1 to p	2.4	μμf
Input: g1 to k + h	2.6	μμf
Output: p to k + h	0.38	μμf

Pentode Section

Grid to plate: g1 to p	0.046	μμf
Input: g1 to k + h + g2 + g3	7.0	μμf
Output: p to k + h + g2 + g3	2.4	μμf
Coupling: pentode grid 1 to triode plate	0.004	μμf
Coupling: pentode plate to triode grid	0.016	μμf
Coupling: pentode plate to triode plate	0.095	μμf

MAXIMUM RATINGS (Design center values)

	Triode*	Pentode	
Plate voltage	300	300	volts
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.5	3.0	watts
Grid 2 dissipation		1.0	watts
Grid 1 circuit resistance			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

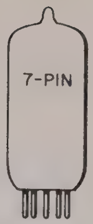
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Triode*	Pentode	
Plate voltage	150	200	volts
Grid 2 (screen) voltage		125	volts
Grid 1 (control-grid) voltage	−5.0		volts
Cathode-bias resistor		82	ohms
Plate resistance (approx.)	5150	150,000	ohms
Transconductance	3300	7000	μmhos
Amplification factor	17		
Plate current	9.5	15	ma
Grid 2 current		3.4	ma
Grid 1 voltage (approx.) for I_b = 100 μa	−14	−8.0	volts

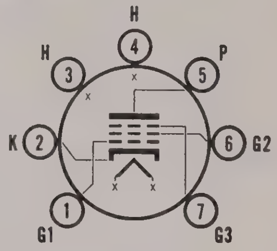
NOTE:

*May be diode connected (grid tied to plate or plate grounded) for video detector use.

CBS 6BJ6



Radio-frequency amplifier for equipment in which low heater current is important



7CM

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	150	ma
Peak heater-cathode voltage, max.	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p, max.	0.0035	0.0035	$\mu\mu f$
Input: g1 to k + h + g2 + g3	4.5	4.5	$\mu\mu f$
Output: p to k + h + g2 + g3	5.5	5.5	$\mu\mu f$

♦JETEC shield 316 connected to pins 2 and 7.

MAXIMUM RATINGS (Design center values)

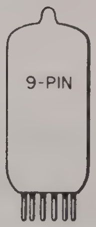
Plate voltage	300	volts
Grid 2 voltage	125	volts
Grid 2 supply voltage	300	volts
Grid 1 voltage, negative d-c	−50	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	3.0	watts
Grid 2 dissipation	0.6	watt

CHARACTERISTICS AND TYPICAL OPERATION

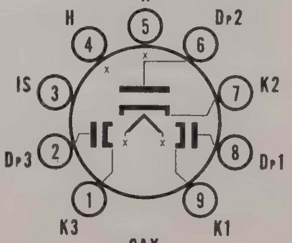
Class A Amplifier

Plate voltage	100	250	volts
Grid 3 (suppressor)	connected to cathode at socket		
Grid 2 (screen) voltage	100	100	volts
Grid 1 (control-grid) voltage	1.0	1.0	volts
Plate resistance (approx.)	0.25	1.3	meg
Transconductance	3650	3600	μmhos
Plate current	9.0	9.2	ma
Grid 2 current	3.5	3.3	ma
Grid 1 voltage (approx.) for $g_m = 10$ μmhos	−20	−20	volts

CBS 6BJ7



D-c restorer for the separate video signals in tricolor television



9AX

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	0.45	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	330	volts
Heater positive to cathode	100	volts

6BJ7 (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Plate 1 to cathode 1 + heater + i.s.	3.0	μμf
Plate 2 to cathode 2 + heater + i.s.	2.8	μμf
Plate 3 to cathode 3 + heater + i.s.	2.8	μμf
Cathode 1 to plate 1 + heater + i.s.	3.8	μμf
Cathode 2 to plate 2 + heater + i.s.	4.0	μμf
Cathode 3 to plate 3 + heater + i.s.	3.8	μμf
Plate 1 to plate 2	0.055	μμf
Plate 2 to plate 3	0.036	μμf
Plate 3 to plate 1	0.038	μμf

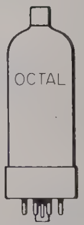
MAXIMUM RATINGS (Design center values)
TV D-c Restorer Service

Plate voltage, peak inverse	330	volts
Output current, d-c (each plate)	1.0	ma
Plate current, peak steady state (each plate)	10	ma

CHARACTERISTICS
Tube Voltage Drop

Conducting 10 ma (each plate)	2.7	volts

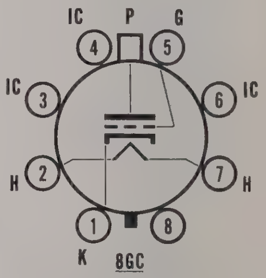
CBS 6BK4



High-voltage regulator for color TV picture tube anode supplies

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	200	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	225	volts
Heater positive to cathode	not recommended	



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.03	μμf
Input: g1 to k + h	2.6	μμf
Output: p to k + h	1.0	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage, d-c	25,000	volts
Plate supply voltage, unregulated d-c	55,000	volts
Grid voltage, d-c	—125	volts
Grid voltage, peak	—400	volts
Plate current	1.5	ma
Plate dissipation	25	watts
Grid circuit resistance		
For use with flyback transformer high voltage supply	3.0	meg

6BK4 (cont.)

CHARACTERISTICS

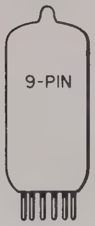
Grid voltage (1), min.*	—7	volts
Grid voltage (2), max.†	—40	volts
Grid voltage change, max. ‡	9	volts

*With $E_b = 30{,}000V$ and $I_b = 1$ ma.

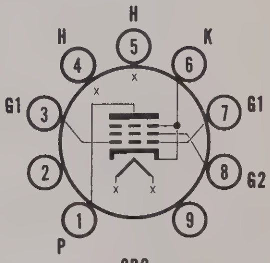
†With $E_b = 30{,}000V$ and $I_b = 0.1$ ma.

‡Difference between grid voltages (1) and (2).

CBS 6BK5



General purpose power amplifier for service where driving voltage is limited



9BQ

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.2	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts, max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.6	μμf
Input: g1 to k + h + g2 + b.p.	13	μμf
Output: p to k + h + g2 + b.p.	5.0	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	250	volts
Grid 2 voltage	250	volts
Grid 1 voltage, peak positive,	0	volts
Plate dissipation	9.0	watts
Grid 2 dissipation	2.5	watts
Grid 1 circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

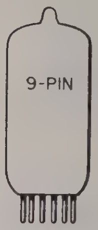
Class A Amplifier

Plate voltage	250	volts
Grid 2 (screen) voltage	250	volts
Grid 1 (control-grid) voltage	—5.0	volts
Plate resistance (approx.)	100,000	ohms
Transconductance	8500	μmhos
Grid 1 input voltage, peak a-f	5.0	volts
Plate current, zero signal	35	ma
Plate current, maximum signal (approx.)	37	ma
Grid 2 current, zero signal	3.5	ma
Grid 2 current, maximum signal (approx.)	10	ma
Load resistance impedance	6500	ohms
Total harmonic distortion (approx.)	7	%
Power output, maximum signal	3.5	watts

6BK6

(See chart for seldom-used tubes)

CBS 6BK7A



6BK7B

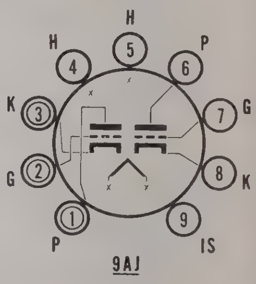
Very-high-frequency cascode amplifier used in TV tuners†

HEATER CHARACTERISTICS

Voltage, a-c or d-c‡	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode★	200	volts
Heater positive to cathode▲	200	volts

★In series cascode application the grounded stage value can be 300V max. under cutoff conditions.

▲D-c component must not exceed 100 volts max.

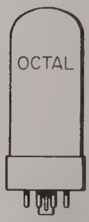


Types 6BK7A and 6BK7B are identical to type 5BK7A except for heater characteristics.

†Type 6BK7A is a direct replacement for the 6BK7.

‡6BK7B is heater warm-up time controlled to 11 secs. average for use in 450 ma series heater strings.

CBS 6BL4



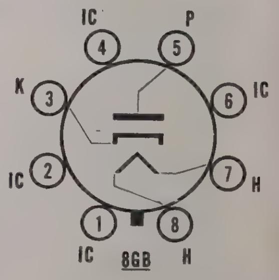
High-voltage half-wave TV damper diode for horizontal-deflection circuits

HEATER CHARACTERISTICS

Voltage	6.3	volts
Current	3.0	amps
Peak heater-cathode voltage, max.*		
Heater negative to cathode†♦	4500	volts
Heater positive to cathode★	300	volts

♦D-c component must not exceed 900 volts max.

★D-c component must not exceed 100 volts max.



6BL4 (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Heater to cathode: h to k	5.0	μμf
Cathode to plate-and-heater: k to p + h	16	μμf
Plate to cathode-and-heater: p to k + h	11.5	μμf

MAXIMUM RATINGS (Design center values unless noted)

TV Damper Service*

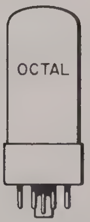
Plate voltage, peak inverse†	4500	volts
Plate current, d-c	200	ma
Plate current, peak	1200	ma
Plate dissipation	8.0	watts

NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

†Absolute maximum value.

CBS 6BL7GT

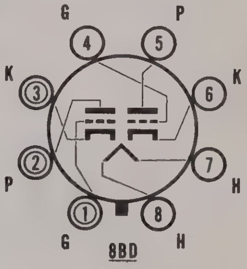


Vertical deflection amplifier and/or oscillator for television receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.5	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1	Section 2	
Grid to plate: g1 to p	6.0	6.0	μμf
Input: g1 to k + h	4.2	4.6	μμf
Output: p to k + h	0.9	0.9	μμf

MAXIMUM RATINGS (Design center values unless noted)*

Vertical Deflection Service	Amplifier	Oscillator	
Plate voltage, d-c	500	500	volts
Plate voltage, peak pos. (absolute max.)	2000		volts
Plate voltage, peak negative		400	volts
Control-grid voltage, peak negative	250		volts
Plate dissipation (each plate)†	10	10	watts
Plate dissipation (total for both plates)†	12	12	watts
Cathode current, average	60	60	ma
Cathode current, peak	210	210	ma
Control-grid circuit resistance	2.2	2.2	meg

6BL7GT (cont.)

CHARACTERISTICS

Each Section

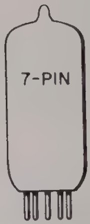
Plate voltage	250	volts
Grid voltage	−9	volts
Plate current (1)	40	ma
Transconductance	7000	μmhos
Amplification factor	15	
Plate resistance, approx.	2150	ohms
Plate current (2) at $E_c = -17$V	4.0	ma
Grid voltage, approx., for $I_b = 50\ \mu a$	−23	volts

NOTES:

*Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

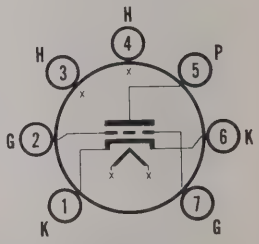
CBS 6BN4



R-f amplifier in vhf television tuners

HEATER CHARACTERISTICS

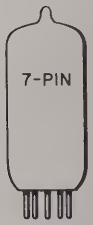
Voltage, a-c or d-c	6.3	volts
Current	200	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode	100	volts



7EG

Type 6BN4 is identical to types 2BN4 and 3BN4 except for heater characteristics. See type 2BN4 for ratings and operating characteristics.

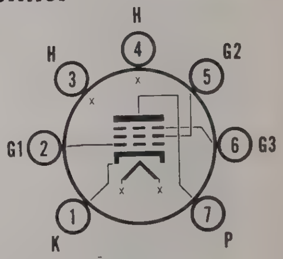
CBS 6BN6



Gated-beam tube for service as f-m discriminator, limiter, and audio amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



7DF

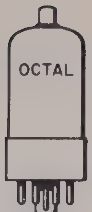
Type 6BN6 is identical to type 3BN6 except for heater ratings.

6BN7

(See chart for seldom-used tubes)

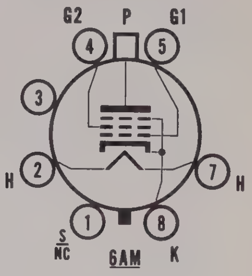
CBS

6BQ6GT



6BQ6GA • 6BQ6GTA
6BQ6GTB

Horizontal deflection amplifier for television receivers



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.2	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES	6BQ6GA	6BQ6GT 6BQ6GTA 6BQ6GTB	
Grid to plate: g1 to p	0.6	0.6	μμf
Input: g1 to k + h + g2 + b.p.	15	15	μμf
Output: p to k + h + g2 + b.p.	7	7.0	μμf

MAXIMUM RATINGS (Design center values unless noted)

Horizontal Deflection Amplifier*	6BQ6GTB	6BQ6GA 6BQ6GTA	6BQ6GT	
Plate supply voltage, d-c (boost + d-c power supply)	600	600	550	volts
Plate voltage, peak pos. (absolute max.)	6000	6000	5500	volts
Plate voltage, peak negative pulse	1250	1250	1250	volts
Grid 2 voltage, d-c	200	200	175	volts
Grid 1 voltage, peak negative	300	300	300	volts
Plate dissipation†	11	11	11	watts
Grid 2 dissipation	2.5	2.5	2.5	watts
Cathode current, av.	110	110	110	ma
Cathode current, peak	400	400	400	ma
Grid 1 circuit resistance	0.47	0.47	0.47	meg

Bulb temperature at hottest point
220°C for 6BQ6GT, 6BQ6GTA, 6BQ6GTB and 6BQ6GA

AVERAGE CHARACTERISTICS	6BQ6GTB	6BQ6GA 6BQ6GT 6BQ6GTA	
Plate voltage	250	250	volts
Grid 2 (screen) voltage	150	150	volts
Grid 1 (control-grid) voltage	−22.5	−22.5	volts
Plate resistance (approx.)	14,500	14,500	ohms
Transconductance	5900	5900	μmhos
Plate current	57	55	ma
Grid 2 current	2.1	2.1	ma
Grid 1 voltage (approx.) for $I_b = 1.0$ ma	−43	−43	volts

6BQ6GT • 6BQ6GA • 6BQ6GTA • 6BQ6GTB (cont.)

Instantaneous Values	6BQ6GTB	6BQ6GA 6BQ6GT 6BQ6GTA	
Plate voltage	60	60	volts
Grid 2 (screen) voltage	150	150	volts
Grid 1 (control-grid) voltage	0	0	volts
Plate current	260	260	ma
Grid 2 current	26	26	ma

Triode Connected

Plate and grid 2 voltage (p + g2 tied together)	150	volts
Grid 1 voltage	−22.5	volts
Amplification factor	4.3	

TYPICAL OPERATION

Horizontal Deflection for 70° Picture Tube

Plate supply voltage (boost + d-c supply)	465	volts
Plate voltage, peak positive (d-c + pulse)	3440	volts
Grid 2 (screen) voltage	140	volts
Grid 1 (control-grid) voltage, d-c	−28	volts
Grid 1 (control-grid) input voltage		
Sawtooth component, peak-to-peak	74	volts
Negative peaking component	18	volts
Plate current, average	83	ma
Grid 2 (screen) current	12.3	ma
Plate dissipation	5.1	watts
Grid 1 resistance	0.33	meg
Anode voltage of CRT	14	kv

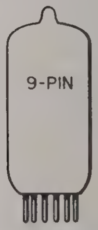
NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

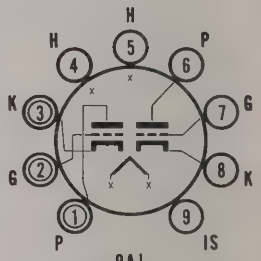
†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

CBS

6BQ7A



High-gain, low-noise vhf cascode amplifier in television tuners



9AJ

HEATER CHARACTERISTICS

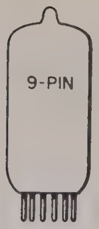
Voltage, a-c or d-c	6.3	volts
Current	400	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode*	200	volts
Heater positive to cathode	200	volts

*This may be as high as 300 volts under cutoff conditions in r-f grounded grid circuit with direct coupled drive.

Type 6BQ7A is identical to type 4BQ7A except for heater characteristics.

CBS

6BR8

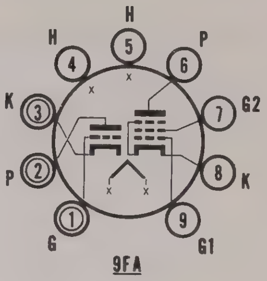


Vhf local oscillator and mixer for fm and television receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	250	volts
Heater positive to cathode★	200	volts

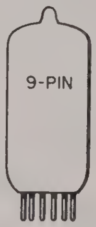
★D-c component must not exceed 100 volts max.



Type 6BR8 is identical to type 5BR8 except for heater characteristics.

CBS

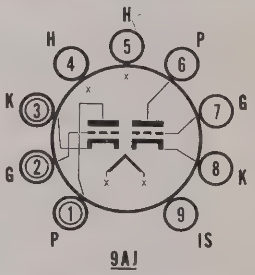
6BS8



Low-noise vhf amplifier for cascode amplifier operation

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	400	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode	200	volts

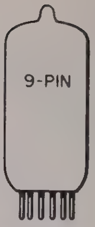


Type 6BS8 is identical to type 4BS8 except for heater characteristics.

6BT6 • 6BU5 • 6BU6

(See chart for seldom-used tubes)

6BU8

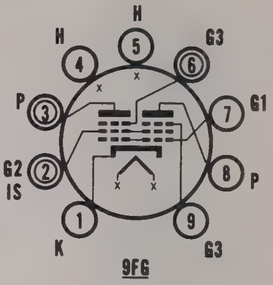


Duopentode for combined sync and agc in television receivers

HEATER CHARACTERISTICS

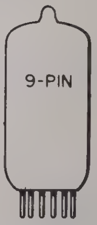
Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



Type 6BU8 is identical to type 3BU8 except for heater characteristics.

6BV8



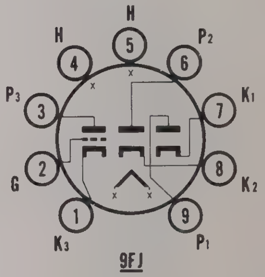
Combined synchronous detector and chrominance amplifier for color TV receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode

Grid to plate: g1 to p	2.0	μμf
Input: g1 to k+ h	3.6	μμf
Output: p to k + h	0.4	μμf

Diode

Diode 1 plate to diode 1 cathode and heater	2.4	μμf
Diode 2 plate to diode 2 cathode and heater	2.4	μμf
Coupling:		
Triode grid to diode 1 plate, max.	0.03	μμf
Triode grid to diode 2 plate, max.	0.07	μμf

6BV8 (cont.)

MAXIMUM RATINGS (Design center values)

Plate voltage	330	volts
Control-grid voltage, positive d-c	0	volts
Plate dissipation	2.7	watts
Diode current for continuous operation, each diode	10	ma
Control-grid circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

Plate voltage	75	200	volts
Control-grid voltage	0		volts
Cathode-bias resistor		330	ohms
Plate resistance (approx.)		5900	ohms
Transconductance		5600	μmhos
Amplification factor		33	
Plate current	14	11	ma
Control-grid voltage (approx.) for $I_b = 100\ \mu a$		−11	volts
Average diode current, with 5 volts applied (each diode)		23	ma

---

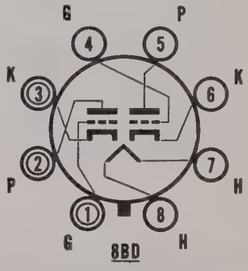
CBS 6BX7GT

Vertical deflection amplifier and/or oscillator for television receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.5	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1‡	Section 2	
Grid to plate: g1 to p	4.2	4.0	μμf
Input: g1 to k + h	4.4	4.8	μμf
Output: p to k + h	1.1	1.2	μμf
Grid to grid		0.11	μμf
Plate to plate		1.5	μμf

MAXIMUM RATINGS (Design center values unless noted)*

	Oscillator‡	Amplifier	
Plate voltage, d-c	500	500	volts
Plate voltage, peak pos. (absolute max.)		2000	volts
Plate voltage, peak negative	400	250	volts
Plate dissipation (each plate)†	10	10	watts
Plate dissipation (total for both plates)†	12	12	watts
Cathode current, average	60	60	ma
Cathode current, peak	180	180	ma
Control-grid circuit resistance, self bias	2.2	2.2	meg

6BX7GT (cont.)

AVERAGE CHARACTERISTICS

	Instantaneous Values		
Plate voltage	100	250	volts
Control-grid voltage	0		volts
Cathode resistor		390	ohms
Plate resistance (approx.)		1300	ohms
Transconductance		7600	μmhos
Amplification factor		10	
Plate current	80	42	ma
Grid 1 voltage (approx.) for $I_b = 50\ \mu a$		−40	volts

NOTES:

*Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

‡Oscillator service is recommended for section 1 (Pins 4, 5, and 6).

6BY5G

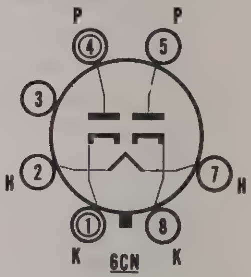
(See chart for seldom-used tubes)

CBS 6BY5GA

Full-wave power rectifier or TV damper†

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.6	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	450	volts
Heater positive to cathode	100	volts



ELECTRICAL DATA

MAXIMUM RATINGS (Design center values unless noted)
Rectifier and Damper Service*

Plate voltage, peak inverse, absolute max. (each plate)		
Rectifier	1400	volts
Damper	3000	volts
Output current, d-c	175	ma
Plate current, peak steady state (each plate)	0.525	amp

CHARACTERISTICS
Tube Voltage Drop

Conducting 175 ma (each plate)	32	volts

TYPICAL OPERATION
Full-Wave Rectifier (Capacitor Input Filter)

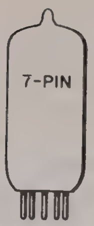
Plate supply voltage, rms (each plate)	375	volts
Plate supply resistance (each plate)	100	ohms
Filter input capacitor	8.0	μf
Output current, d-c	175	ma
Output voltage at filter input, d-c	380	volts

NOTES:

*In damper applications, voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

†Type 6BY5G, except for its ST-14 bulb, is identical to type 6BY5GA.

CBS 6BY6

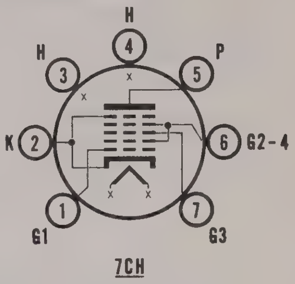


Gated amplifier for service as a sync separator or clipper in color television receivers

HEATER CHARACTERISTICS

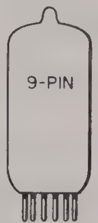
Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



Type 6BY6 is identical to type 3BY6 except for heater ratings.

CBS 6BY8



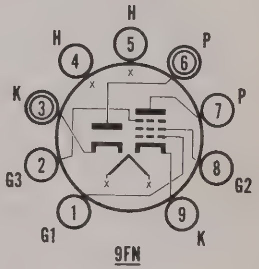
R-f and i-f amplifier combined with a diode detector, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield⧫

Pentode

Grid to plate: g1 to p, max.	.0035	μμf
Input: g1 to k + h + g2 + g3 + i.s.	5.5	μμf
Output: p to k + h + g2 + g3 + i.s.	5.0	μμf

Diode

Diode plate to all	4.8	μμf

⧫JETEC shield 315 connected to pentode cathode

MAXIMUM RATINGS (Design center values)

Pentode

Plate voltage	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	300	volts
Grid 1 voltage, negative d-c	−50	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	3.0	watts
Grid 2 dissipation	0.65	watt

Diode

Plate voltage, peak inverse	430	volts
Plate current, peak	180	ma
D-c current	45	ma

6BY8 (cont.)

CHARACTERISTICS AND TYPICAL OPERATION

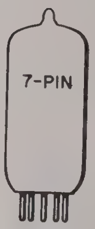
Class A Amplifier—(Pentode Section)

Plate voltage	100	250	volts
Grid 3 (suppressor)	connect to pentode cathode at socket		
Grid 2 (screen) voltage	100	150	volts
Cathode bias resistor	150	68	ohms
Plate resistance (approx.)	0.5	1.0	meg
Transconductance	3900	5200	μmhos
Plate current	5.0	10.6	ma
Grid 2 current	2.1	4.3	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−4.2	−6.5	volts

Diode Section

Average diode current at 10 volts, d-c	60	ma

CBS 6BZ6

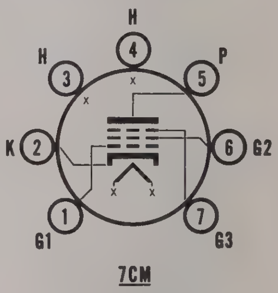


Intermediate-frequency amplifier for gain-controlled stages in TV receivers

HEATER CHARACTERISTICS

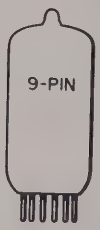
Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



Type 6BZ6 is identical to type 3BZ6 except for heater ratings.

CBS 6BZ7



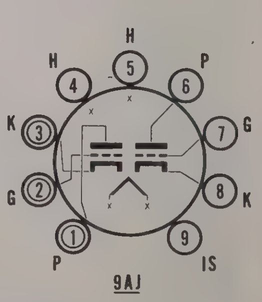
High-gain, low-noise cascode amplifier in television receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	400	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode★	200	volts
Heater positive to cathode†	200	volts

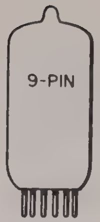
★This may be as high as 300 volts under cutoff conditions in r-f grounded grid circuit with direct coupled drive.

†D-c component must not exceed 100 volts.



Type 6BZ7 is identical to type 4BZ7 except for heater characteristics.

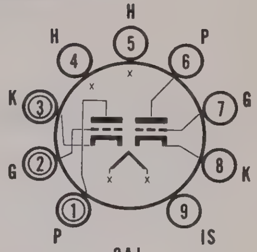
CBS 6BZ8



Gain-controlled low-noise vhf cascode amplifier for television tuners

HEATER CHARACTERISTICS

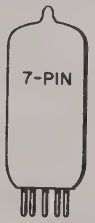
Voltage, a-c or d-c	6.3	volts
Current	400	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode	200	volts



9AJ

Type 6BZ8 is identical to type 4BZ8 except for heater characteristics.

CBS 6C4

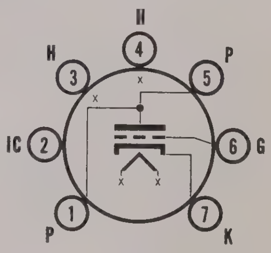


High-frequency oscillator or Class C radio-frequency amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



6BG

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	1.6	μμf
Input: g1 to k + h	1.8	μμf
Output: p to k + h	1.3	μμf

MAXIMUM RATINGS (Design center values)	Class C Teleg.†	Class A Amp.	
Plate voltage	300	300	volts
Plate dissipation	5.0	3.5	watts
Plate current		25	ma
Grid current		8.0	ma
Control-grid circuit resistance			
Fixed bias		0.25	meg
Self bias		1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION	Class C Teleg.†	Class A Amp.		
Plate voltage	300	100	250	volts
Control-grid voltage	—27	0	—8.5	volts
Plate resistance (approx.)		6250	7700	ohms
Transconductance		3100	2200	μmhos
Amplification factor		19.5	17	
Plate current	25	11.8	10.5	ma
Grid current	8			ma
Drive power	.35			watt
Output	5.5			watts

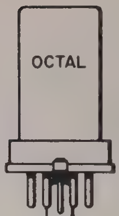
NOTE:

†For use in Class C Telegraphy operation as an r-f power amplifier and oscillator with typical operation up to 50 megacycles. Approximately 2.5 watts output can be obtained when the 6C4 is operated as a 150 mc oscillator with a 10000 ohm grid resistor at full input.

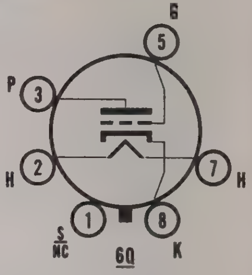
CBS

6C5

6C5GT



General purpose triode for use as an oscillator, detector, or amplifier



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES♦

Grid to plate: g1 to p	1.6	μμf
Input: g1 to k + h	3.6	μμf
Output: p to k + h	11.0	μμf

♦With shell or shield connected to the cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Control-grid voltage, positive d-c	0	volts
Plate dissipation	2.5	watts

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

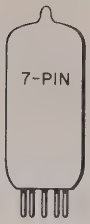
Plate voltage	250	volts
Control-grid voltage	−8.0	volts
Plate resistance (approx.)	10	kilohms
Transconductance	2000	μmhos
Amplification factor	20	
Plate current	8.0	ma

6C6 • 6C7 • 6C8G

(See chart for seldom-used tubes)

CBS

6CA5

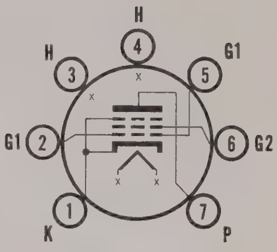


A-f power amplifier with high output from a low B supply voltage

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1200	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



7CV

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.5	μμf
Input: g1 to k + h + g2 + b.p.	15.0	μμf
Output: p to k + h + g2 + b.p.	9.0	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	130	volts
Grid 2 voltage	130	volts
Grid voltage, peak positive	0	volts
Plate dissipation	5.0	watts
Grid 2 dissipation	1.4	watts
Grid circuit resistance		
Fixed bias	0.5	meg
Self bias	0.5	meg
Bulb temperature at hottest point	180	°C

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

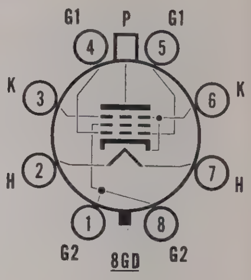
Plate voltage	110	125	volts
Grid 2 (screen) voltage	110	125	volts
Grid 1 (control-grid) voltage	−4.0	−4.5	volts
Plate resistance (approx.)	16,000	15,000	ohms
Transconductance	8100	9200	μmhos
Grid 1 input voltage, peak a-f	4.0	4.5	volts
Plate current, zero signal	32	37	ma
Plate current, maximum signal	31	36	ma
Grid 2 current, zero signal	3.5	4.0	ma
Grid 2 current, maximum signal	7.5	11.0	ma
Load resistance impedance	3500	4500	ohms
Total harmonic distortion (approx.)	5	6	%
Power output, maximum signal	1.1	1.5	watts

CBS

6CB5

6CB5A

Horizontal deflection amplifier for tricolor television receivers



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	2.5	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	6CB5	6CB5A	
Grid to plate: g1 to p	0.8	0.4	μμf
Input: g1 to k + h + g2 + b.p.	24	22	μμf
Output: p to k + h + g2 + b.p.	10	10	μμf

MAXIMUM RATINGS (Design center values unless noted)

Horizontal Deflection Amplifier*	6CB5	6CB5A	
Plate supply voltage, d-c (boost + d-c power supply)	700	800	volts
Plate voltage, peak pos. (absolute max.)	6800	6800	volts
Plate voltage, peak negative pulse	1500	1500	volts
Grid 2 voltage, d-c	200	200	volts
Grid 1 voltage, peak negative	200	200	volts
Grid 1 voltage, d-c	—50	—50	volts
Plate dissipation†	23	23	watts
Grid 2 dissipation	3.6	3.6	watts
Cathode current, average	200	220	ma
Cathode current, peak	—	770	ma
Grid 1 circuit resistance (grid-resistor bias)	0.47	0.47	meg
Bulb temperature at hottest point	210	220	°C

AVERAGE CHARACTERISTICS

Class A Amplifier	Instantaneous values		
Plate voltage	75	175	volts
Grid 2 (screen) voltage	150	175	volts
Grid 1 (control-grid) voltage	0	—30	volts
Plate resistance (approx.)		5000	ohms
Transconductance		8800	μmhos
Plate current	460	90	ma
Grid 2 current	42	6	ma
Grid 1 voltage (approx.) for $I_b = 1.0$ ma		—60	volts
Triode amplification factor (g1 + g2 tied together)		3.8	

NOTES:

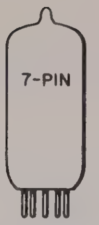
*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

CBS

6CB6

6CB6A

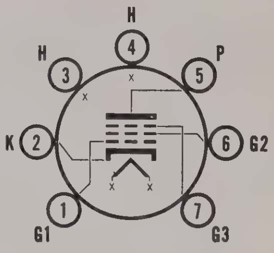


High gain radio-frequency or intermediate-frequency amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



7CM

6CB6A

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

Types 6CB6 and 6CB6A are identical to type 3CB6 except for heater ratings.

CBS

6CD6G

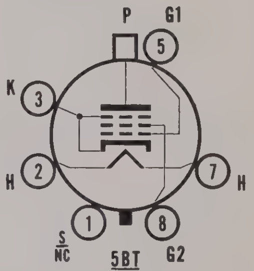
6CD6GA

High efficiency horizontal deflection amplifier for television receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	2.5	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



5BT

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	6CD6G	6CD6GA	
Grid to plate: g1 to p	0.8	1.1	μμf
Input: g1 to k + h + g2 + b.p.	24	22	μμf
Output: p to k + h + g2 + b.p.	9.5	8.5	μμf

MAXIMUM RATINGS (Design center values unless noted)

Horizontal Deflection Amplifier*	6CD6G	6CD6GA	
Plate supply voltage, d-c (boost + d-c power supply)	700	700	volts
Plate voltage, peak pos. (absolute max.)	6600	7000	volts
Plate voltage, peak negative pulse	1500	1500	volts
Grid 2 voltage, d-c	175	175	volts
Grid 1 voltage, peak negative	200	200	volts
Plate dissipation†	15	20	watts
Grid 2 dissipation	3.0	3.0	watts
Cathode current, average	200	200	ma
Cathode current, peak	700	700	ma
Grid 1 circuit resistance	0.47	0.47	meg
Bulb temperature at hottest point	210	225	°C

6CD6G • 6CD6GA (cont.)

AVERAGE CHARACTERISTICS

	Instantaneous values		
Plate voltage	60	175	volts
Grid 2 (screen) voltage	100	175	volts
Grid 1 (control-grid) voltage	0	—30	volts
Plate resistance (approx.)		7200	ohms
Transconductance		7700	μmhos
Plate current	230	75	ma
Grid 2 current	21	5.5	ma
Grid 1 voltage (approx.) for I_b = 1.0 ma		—55	volts
Triode amplification factor (p + g2 tied together)		3.9	

TYPICAL OPERATION

Horizontal Deflection for 90° Picture Tube

Plate supply voltage	300	volts
Plate voltage, average (boost + d-c supply)	620	volts
Plate voltage, peak positive (d-c + pulse)	5600	volts
Grid 2 (screen) voltage	125	volts
Grid 2 current	16	ma
Grid 1 (control-grid) input voltage		
Sawtooth component	140	volts
Peak to peak	180	volts
Plate current, average	113	ma
Plate current, peak	380	ma
Plate dissipation	11	watts
Anode voltage of CRT	17.2	kv

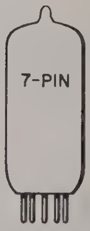
NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

CBS

6CE5



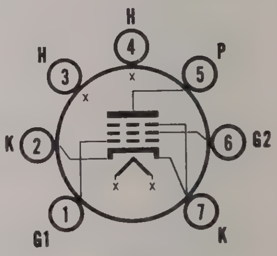
Controlled cutoff pentode amplifier for r-f or i-f service

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

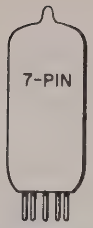
★D-c component must not exceed 100 volts max.



7BD

Type 6CE5 is identical to type 3CE5 except for different heater characteristics.

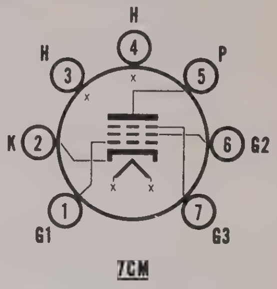
CBS 6CF6



Controlled-cutoff pentode for radio-frequency or intermediate-frequency amplifier service

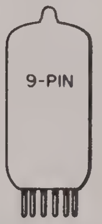
HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



Type 6CF6 is identical to type 3CF6 except for heater characteristics. Except for its cutoff characteristic, the 6CF6 is similar to the 6CB6.

CBS 6CG7



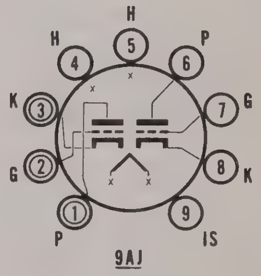
Amplifier or TV sweep oscillator, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1	Section 2	
Grid to plate: g1 to p	4.0	4.0	μμf
Input: g1 to k + h + i.s.	2.3	2.3	μμf
Output: p to k + h + i.s.	2.2	2.2	μμf

6CG7 (cont.)

MAXIMUM RATINGS **(Design center values)***	**Class A Amplifier**	**Horizontal Deflection Oscillator†**	**Vertical Deflection Oscillator♦**	
Plate voltage	300	300	300	volts
Control-grid voltage, positive d-c	0			volts
Control-grid voltage, peak negative		600	400	volts
Plate dissipation				
Each plate	3.5	3.5	3.5	watts
Both plates	5.0	5.0	5.0	watts
Cathode current				
Average	20	20	20	ma
Peak		300	70	ma
Control-grid circuit resistance				
Fixed bias	1.0	2.2	2.2	meg
Self bias		2.2	2.2	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier*

Plate voltage	90	250	volts
Control-grid voltage	0	−8.0	volts
Plate resistance (approx.)	6700	7700	ohms
Transconductance	3000	2600	μmhos
Amplification factor	20	20	
Plate current	10	9	ma
Plate current for $E_{c1} = -12.5$ volts		1.3	ma
Control-grid voltage (approx.) for $I_b = 10\ \mu a$	−7.0	−18	volts

NOTES:

*Values are for each unit.

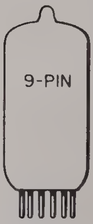
†Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

♦Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

CBS

6CG8

6CG8A

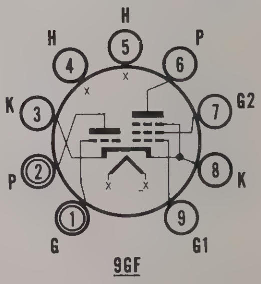


Vhf triode oscillator and pentode mixer for TV or a-m and f-m receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts.



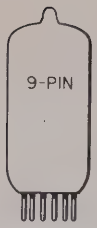
6CG8A

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

Types 6CG8 and 6CG8A are identical to type 5CG8 except for heater characteristics.

CBS

6CH8



Combined sync separator, clipper or phase splitter and multifunction amplifier, heater warm-up time controlled for series strings

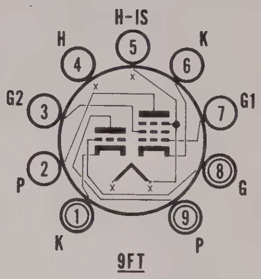
HEATER CHARACTERISTICS

	Triode	Pentode	
Voltage, a-c or d-c	6.3	6.3	volts
Current	450	450	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode	200	▲	volts
Heater positive to cathode	200★	0	volts
Warm-up time	11 secs. average		

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.

▲Not to exceed operating cathode bias to prevent negative grid 3, tied to heater, from affecting characteristics.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

Grid to plate: g1 to p	1.6	μμf
G_1 to k + h + pentode g3 + i.s.	1.9	μμf
Output: p to k + h + pentode g3 + i.s.	1.6	μμf

Pentode Section

Grid to plate: g1 to p, max.	0.025	μμf
Input: g1 to k + h + g2 + g3 + i.s.	7.0	μμf
Output: p to k + h + g2 + g3 + i.s.	2.25	μμf
Coupling: pentode grid 1 to triode plate	0.02	μμf
Coupling: pentode plate to triode grid	0.005	μμf
Coupling: pentode plate to triode plate	0.04	μμf

MAXIMUM RATINGS (Design center values)

Class A Amplifier	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 3 voltage, positive		0	volts
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.6	2.0	watts
Grid 2 dissipation			
For E_{c2} up to 150 volts		0.5	watts
For E_{c2} between 150 and 300 volts	See Rating Chart in APPENDIX		
Grid 1 circuit resistance*			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

6CH8 (cont.)

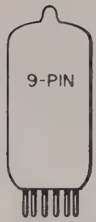
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	**Triode**	**Pentode**	
Plate supply voltage	200	200	volts
Grid 3 (suppressor) supply voltage		0	volts
Grid 2 (screen) supply voltage		150	volts
Grid 1 (control-grid) voltage	−6.0		volts
Cathode-bias resistor		180	ohms
Plate resistance (approx.)	5.75	300	kilohms
Transconductance	3300	6200	μmhos
Amplification factor	19		
Plate current	13	9.5	ma
Grid 2 current		2.8	ma
Grid 1 voltage (approx.) for $I_b = 10$ μa	−19	−8	volts

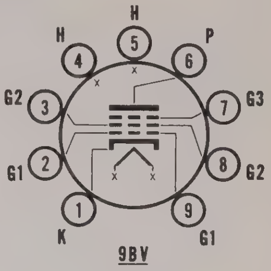
NOTES:

*If either unit is operated at maximum rated conditions, grid 1 circuit resistances for both units should not exceed the stated values.

CBS 6CL6



Video output amplifier in television receivers or audio power amplifier



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	650	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.12	μμf
Input: g1 to k + h + g2 + g3 + i.s.	11.0	μμf
Output: p to k + h + g2 + g3 + i.s.	5.5	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	150	volts
Grid 2 supply voltage	300	volts
Grid 1 voltage, peak negative	50	volts
Grid 1 voltage, peak positive	0	volts
Plate dissipation	7.5	watts
Grid 2 dissipation	1.7	watts
Grid circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg
Bulb temperature at hottest point	200	°C

CHARACTERISTICS AND TYPICAL OPERATION

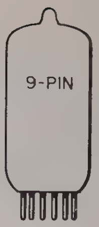
Class A Amplifier

Plate voltage	250	volts
Grid 3 (suppressor) voltage	connected to cathode at socket	
Grid 2 (screen) voltage	150	volts
Grid 1 (control-grid) voltage	—3.0	volts
Plate resistance (approx.)	9000	ohms
Transconductance	11,000	μmhos
Grid 1 input voltage, peak a-f	3.0	volts
Plate current, zero signal	30	ma
Plate current, maximum signal	31	ma
Grid 2 current, zero signal	7.0	ma
Grid 2 current, maximum signal	7.2	ma
Grid 1 bias for $I_b = 10\ \mu a$	—14	volts
Load resistance impedance	7500	ohms
Total harmonic distortion (approx.)	8	%
Power output, maximum signal	2.8	watts

Video Amplifier with 4.0 Mc bandwidth

Plate supply voltage	300	volts
Grid 2 (screen) supply voltage	300	volts
Grid 3 (suppressor) voltage	connected to cathode at socket	
Grid 1 (control-grid) voltage	—2.0	volts
Grid 2 resistor	24,000	ohms
Grid 1 resistor	100,000	ohms
Voltage output, peak-to-peak	132	volts
Grid-to-grid input voltage, peak a-f	3.0	volts
Plate current, zero signal	30	ma
Grid 2 current, zero signal	7.0	ma
Load resistance, plate-to-plate	3900	ohms

6CL8



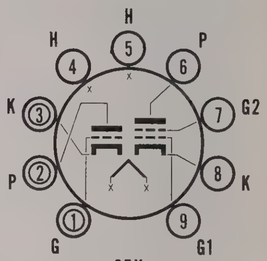
Very-high-frequency oscillator and mixer used in TV tuners

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

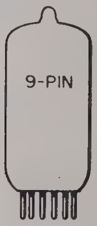
★D-c component must not exceed 100 volts max.



9FX

Type 6CL8 is identical to type 5CL8 except for heater characteristics.

6CM6

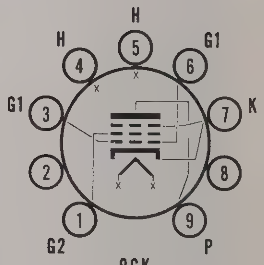


Audio power amplifier or vertical deflection amplifier in TV receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



9CK

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.7	μμf
Input: g1 to k + h + g2 + b.p.	8.0	μμf
Output: p to k + h + g2 + b.p.	8.5	μμf

MAXIMUM RATINGS (Design center values unless noted)	**Class A Amplifier**	**Vertical Deflection Amplifier*** **Pentode**	**Vertical Deflection Amplifier*** **Triode‡**	
Plate voltage	315	315	315	volts
Plate voltage peak pos. (absolute max.)		2000	2000	volts
Grid 2 voltage	285	285		volts
Grid voltage, peak negative		250	250	volts
Plate dissipation†	12	8	9	watts
Grid 2 dissipation†	2	1.75		watts
Cathode current, average		40	40	ma
Cathode current, peak		120	120	ma
Grid circuit resistance				
Fixed bias	0.1			meg
Self bias	0.5	2.2	2.2	meg

6CM6 (cont.)

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	**Single Tube**		**Two Tubes (Push-Pull)**	
Plate voltage	180	315	250	volts
Grid 2 (screen) voltage	180	225	250	volts
Grid 1 (control-grid) voltage	—8.5	—13.0	—15.0	volts
Plate resistance (approx.)	50,000	80,000		ohms
Transconductance	3700	3750		µmhos
Grid 1 input voltage, peak a-f	8.5	13.0	30▲	volts
Plate current, zero signal	29	34	70	ma
Plate current, maximum signal	30	35	79	ma
Grid 2 current, zero signal	3.0	2.2	5	ma
Grid 2 current, maximum signal	4.0	6.0	13	ma
Load resistance impedance	5500	8500	10,000⧫	ohms
Total harmonic distortion (approx.)	8	12	5	%
Power output, maximum signal	2.0	5.5	10	watts

Vertical Deflection Amplifier*	**Pentode**	**Triode‡**	
Plate voltage	250	250	volts
Grid 2 (screen) voltage	250		volts
Grid 1 (control-grid) voltage	—12.5	—12.5	volts
Plate resistance, per tube	50,000	1960	ohms
Transconductance	4100	5000	µmhos
Plate current	45	49.5	ma
Grid 2 current	4.5		ma
Grid 1 bias for $I_b = 0.5$ ma	—37	—37	volts
Amplification		9.8	

NOTES:

*Voltage pulse duration must not exceed 2500 µs in a 525-line, 30-frame system.

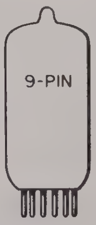
†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

‡Grid 2 connected to plate.

⧫Plate to plate.

▲Grid to grid.

CBS 6CM7



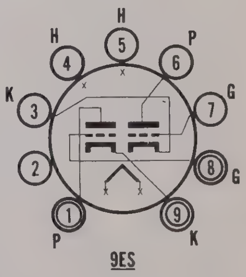
Combined vertical deflection oscillator and amplifier with dissimilar sections

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1	Section 2	
Grid to plate: g1 to p	3.8	3.0	µµf
Input: g1 to k + h	2.0	3.5	µµf
Output: p to k + h	0.5	0.4	µµf

MAXIMUM RATINGS

(Design center values unless noted) Vertical Deflection Service	Section 1† Oscillator	Section 2† Amplifier	
Plate voltage, d-c	500	500	volts
Plate voltage, peak pos. (absolute max.)		2200	volts
Control-grid voltage, peak negative	200	200	volts
Plate dissipation	1.25	5.5	watts
Cathode current, average	15	20	ma
Cathode current, peak	70	70	ma
Control-grid circuit resistance			
Fixed bias	2.2	1.0	meg
Self bias	2.2	2.5	meg

AVERAGE CHARACTERISTICS

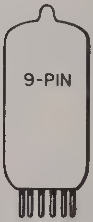
Class A Amplifier	Section 1†	Section 2†	
Plate voltage	200	250	volts
Control-grid voltage	−7.0	−8.0	volts
Plate resistance (approx.)	10,500	4100	ohms
Transconductance	2000	4400	μmhos
Amplification factor	21	18	
Plate current	5.0	20	ma
Grid 1 voltage (approx.) for $I_b = 10\mu a$	14		volts

NOTES:

*Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

†Section 1 connects to pins 3, 6, and 7. Section 2 connects to pins 1, 8, and 9.

6CN7



Combined horizontal phase detector and reactance tube in TV, or triode for audio or sync service

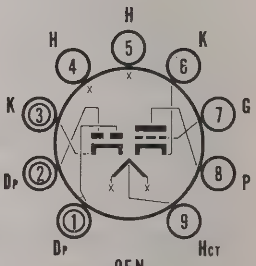
HEATER CHARACTERISTICS

	Series	Parallel†	
Voltage, a-c or d-c	6.3	3.15	volts
Current	300	600	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode	200	200	volts
Heater positive to cathode★	200	200	volts

★D-c component must not exceed 100 volts max.

Warm-up time...... 11 secs. average† (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

†Warm-up time refers only to parallel connection.



9EN

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode		
Grid to plate: g1 to p	1.8	μμf
Input: g1 to k + h	1.5	μμf
Output: p to k + h	0.5	μμf

Diode		
Diode-1 plate to diode cathode and heater	3.6	μμf
Diode-2 plate to diode cathode and heater	3.6	μμf
Triode grid to each diode plate	.006	μμf

6CN7 (cont.)

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Control-grid voltage, positive d-c	0	volts
Plate dissipation	1.0	watt
Diode current for continuous operation, each diode	5.0	ma

CHARACTERISTICS AND TYPICAL OPERATION
Class A Amplifier

Plate voltage	100	250	volts
Control-grid voltage	—1.0	—3.0	volts
Plate resistance (approx.)	.054	.058	meg
Transconductance	1300	1200	µmhos
Amplification factor	70	70	
Plate current	0.8	1.0	ma
Average diode current, each diode, with 5.0 volts d-c applied		20	ma

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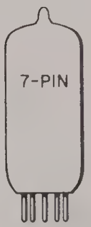
CBS

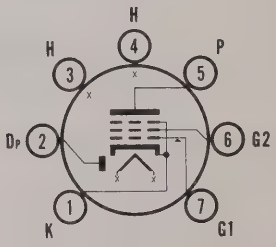
6CR6



Combined detector and automatic volume controlled audio amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode	100	volts



7EA

ELECTRICAL DATA

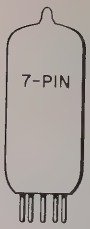
MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	150	volts
Grid voltage, positive d-c	0	volts
Plate dissipation	2.5	watts
Grid 2 dissipation	0.3	watt
Grid 1 circuit resistance	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION
Class A Amplifier

Plate voltage	250	volts
Grid 2 (screen) voltage	100	volts
Grid 1 (control-grid) voltage	—2.0	volts
Plate resistance (approx.)	0.8	meg
Transconductance	2200	µmhos
Plate current	9.6	ma
Grid 2 current	2.6	ma
Grid 1 voltage (approx.) for $g_m = 10$ µmhos	—32	volts
Average diode current with 10 volts, d-c applied	2.0	ma

CBS 6CS6

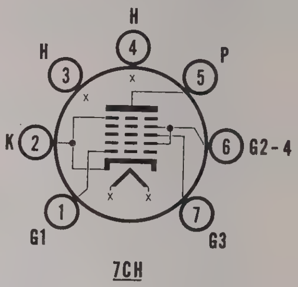


Heptode sync separator and clipper in television receivers

HEATER CHARACTERISTICS

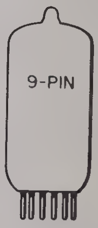
Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts.



Type 6CS6 is identical to type 3CS6 except for heater characteristics.

CBS 6CS7



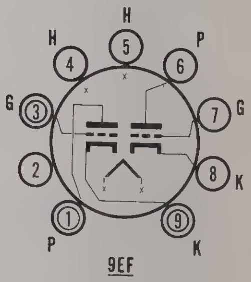
TV vertical deflection amplifier and/or oscillator, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs.	average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1♦	Section 2	
Grid to plate: g1 to p	2.6	2.6	μμf
Input: g1 to k + h	1.8	3.0	μμf
Output: p to k + h	0.5	0.5	μμf

MAXIMUM RATINGS (Design center values unless noted)

Vertical Deflection Oscillator and Amplifier*	Section 1 Oscillator♦	Section 2 Amplifier	
Plate voltage, d-c	500	500	volts
Plate voltage, peak pos. (absolute max.)		2200	volts
Control-grid voltage, peak negative	400	250	volts
Plate dissipation†	1.25	6.5	watts
Cathode current, average	20	30	ma
Cathode current, peak	70	105	ma
Control-grid circuit resistance	2.2	2.2	meg

6CS7 (cont.)

AVERAGE CHARACTERISTICS

	Oscillator◆	Amplifier	
Plate voltage	250	250	volts
Control-grid voltage	−8.5	−10.5	volts
Plate resistance	7700	3450	ohms
Transconductance	2200	4500	µmhos
Amplification factor	17	15.5	
Plate current	10.5	19.0	ma
Plate current for $E_c = -16$ volts		3.0	ma
Grid 1 voltage (approx.) for $I_b = 10$ µa	−24		volts
Grid 1 voltage (approx.) for $I_b = 50$ µa		−22	volts

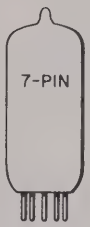
NOTES:

◆Triode section 1 connects to pins 6, 7, and 8; triode section 2 connects to pins 1, 3, and 9.

*Voltage pulse duration must not exceed 2500 µs in a 525-line, 30-frame system.

†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

CBS 6CU5

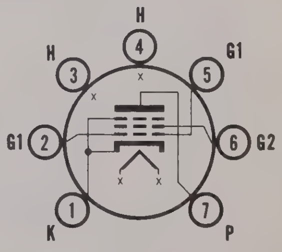


Audio output tube for television receivers with low plate supply voltage

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.2	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component 100 volts max.



7CV

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.7	µµf
Input: g1 to k + h + g2 + b.p.	13.2	µµf
Output: p to k + h + g2 + b.p.	8.6	µµf

MAXIMUM RATINGS (Design center values)

Plate voltage	135	volts
Grid 2 voltage	117	volts
Grid 1 voltage, positive	0	volts
Plate dissipation	6.0	watts
Grid 2 dissipation	1.25	watts
Grid 1 circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg
Bulb temperature at hottest point	220	°C

CHARACTERISTICS AND TYPICAL OPERATION

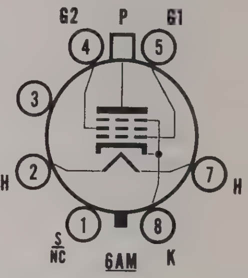
Class A Amplifier

Plate voltage	120	volts
Grid 2 (screen) voltage	110	volts
Grid 1 (control-grid) voltage	−8	volts
Plate resistance (approx.)	10,000	ohms
Transconductance	7500	µmhos
Grid 1 input voltage, peak a-f	8.0	volts
Plate current, zero signal	49	ma
Plate current, maximum signal	50	ma
Grid 2 current, zero signal	4	ma
Grid 2 current, maximum signal	8.5	ma
Load resistance impedance	2500	ohms
Total harmonic distortion (approx.)	10	%
Power output, maximum signal	2.3	watts

CBS # 6CU6

Horizontal deflection amplifier for TV receivers

HEATER CHARACTERISTICS



Voltage, a-c or d-c	6.3	volts
Current	1.2	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.6	μμf
Input: g1 to k + h + g2 + b.p.	15.0	μμf
Output: p to k + h + g2 + b.p.	7.0	μμf

MAXIMUM RATINGS (Design center values unless noted)

Horizontal Deflection Amplifier*

Plate supply voltage, d-c (boost + d-c power supply)	600	volts
Plate voltage, peak pos. (absolute max.)	6000	volts
Plate voltage, peak negative pulse	1250	volts
Grid 2 voltage, d-c	200	volts
Grid 1 voltage, peak negative	300	volts
Plate dissipation†	11	watts
Grid 2 dissipation	2.5	watts
Cathode current, average	110	ma
Cathode current, peak	400	ma
Grid 1 circuit resistance	.47	meg
Bulb temperature at hottest point	220	°C

AVERAGE CHARACTERISTICS

	Instantaneous values		
Plate voltage	60	250	volts
Grid 2 (screen) voltage	150	150	volts
Grid 1 (control-grid) voltage	0	−22.5	volts
Plate resistance (approx.)		14,500	ohms
Transconductance		5900	μmhos
Plate current	260	57	ma
Grid 2 current	26	2.1	ma
Grid 1 voltage (approx.) for $I_b = 1.0$ ma		−43	volts

Triode Connected

Plate and grid 2 voltage (p + g2 tied together)	150	volts
Grid 1 voltage	−22.5	volts
Amplification factor	4.3	

TYPICAL OPERATION

Horizontal Deflection for 70° Picture Tube*

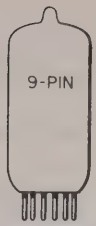
Plate supply voltage (boost + d-c supply)	465	volts
Plate voltage, peak positive (d-c + pulse)	3440	volts
Grid 2 (screen) voltage	140	volts
Grid 1 (control-grid) voltage, d-c	−28	volts
Grid 1 (control-grid) input voltage		
Negative peaking component	18	volts
Peak to peak	74	volts
Plate current	83	ma
Grid 2 current	12.3	ma
Plate dissipation	5.1	watts
Grid 1 resistance	0.33	meg
Anode voltage of CRT	14	kv

NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

CBS 6CX7



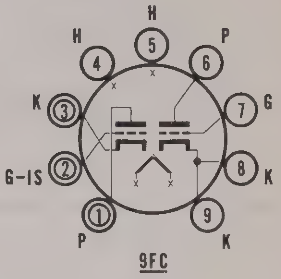
Low-noise very high frequency amplifier for cascode operation

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	400	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode†	200	volts
Heater positive to cathode★	200	volts

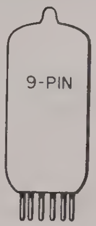
★D-c component must not exceed 100 volts max.

†Under cutoff conditions when the tube is used as a cascode amplifier, this rating may be as high as 300 volts maximum.



Type 6CX7 is identical to type 4CX7 except for heater characteristics.

CBS 6CZ5



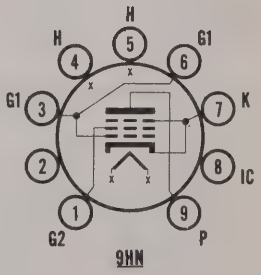
Beam power tube for 110° vertical deflection or audio power amplifier service, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

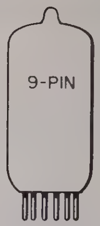
(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.

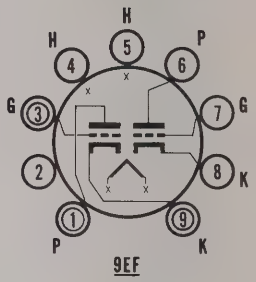


Type 6CZ5 is identical to type 5CZ5 except for heater characteristics. See type 5CZ5 for ratings and operating characteristics.

CBS 6DA7



Combined vertical amplifier and oscillator for TV receivers



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.0	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1	Section 2	
Grid to plate: g1 to p	2.3	6.9	μμf
Input: g1 to k + h	2.0	5.5	μμf
Output: p to k + h	0.415	0.82	μμf

MAXIMUM RATINGS (Design center values)

	Section 1	Section 2	
Plate voltage	300	500	volts
Plate voltage, peak positive pulse†		1800	volts
Control-grid voltage, peak negative d-c†	−400	−400	volts
Control-grid voltage, negative d-c	−50	−50	volts
Plate dissipation	2.0	6.0	watts
Cathode current	20	40	ma
Control-grid circuit resistance, self bias		2.2	meg

CHARACTERISTICS AND TYPICAL OPERATION

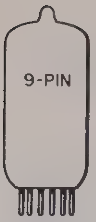
	Section 1	Section 2	
Plate voltage	250	150	volts
Control-grid voltage	−8	−17.5	volts
Plate resistance (approx.)	7700	1100	ohms
Transconductance	2600	5700	μmhos
Amplification factor	20	6.3	
Plate current	9.0	40	ma
Zero bias plate current for $E_b = 60$ volts		80	ma
Control-grid voltage (approx.) for $I_b = 0.5$ ma		−42	volts
Control-grid voltage (approx.) for gm = 30 μmhos and $I_b = 50$ μa	−16.5		volts

NOTES:

†Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

CBS

6DB5

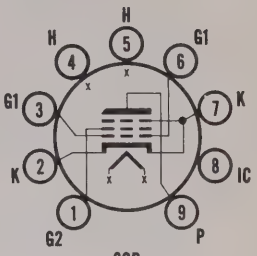


Vertical deflection amplifier for scanning wide-angle picture tubes or audio power amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.2	amps
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



9GR

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.5	μμf
Input: g1 to k + h + g2 + b.p.	15	μμf
Output: p to k + h + g2 + b.p.	9	μμf

MAXIMUM RATINGS (Design center values unless noted)

Vertical Deflection Amplifier*

Plate voltage	300	volts
Plate voltage, peak pos. (absolute max.)	2000	volts
Grid 2 voltage, d-c	150	volts
Grid 1 voltage, peak negative	250	volts
Plate dissipation†	10	watts
Grid 2 dissipation	1.25	watts
Cathode current, average	55	ma
Cathode current, peak	200	ma
Grid 1 circuit resistance		
Fixed bias	0.1	meg
Self bias (Rk = 100 ohms minimum)	2.2	meg

AVERAGE CHARACTERISTICS

Class A Amplifier

Plate voltage	110	200	volts
Grid 2 (screen) voltage	110	125	volts
Grid 1 (control-grid) voltage	−7.5		volts
Cathode bias resistor		180	ohms
Plate resistance (approx.)	13,000	28,000	ohms
Transconductance	8000	8000	μmhos
Grid 1 input voltage, peak a-f	7.5	8.5	volts
Plate current, zero signal	49	46	ma
Plate current, maximum signal	50	47	ma
Grid 2 current, zero signal	4.0	2.2	ma
Grid 2 current, maximum signal	10	8.5	ma
Load resistance impedance	2000	4000	ohms
Total harmonic distortion (approx.)	10	10	%
Power output, maximum signal	2.1	3.8	watts

Triode Connected

Plate and grid 2 voltage (p + g2 tied together)	225	volts
Grid 1 voltage	−30	volts
Plate resistance	1500	ohms
Transconductance	3800	μmhos

6DB5 (cont.)

Vertical Deflection Amplifier

Plate supply voltage	125	volts
Plate voltage, peak positive (approx.)	720	volts
Grid 2 (screen) supply voltage	125	volts
Cathode bias resistor	100	ohms
Grid 1 (control-grid) input voltage		
Sawtooth component	18	volts
Peak to peak	18	volts
Cathode current, average d-c	40	ma
Cathode current, peak to peak	108	ma
Plate dissipation	5.25	watts
Plate output voltage		
Sawtooth component	190	volts
Peak to peak (approx.)	685	volts

NOTES:

*Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

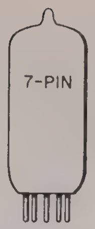
†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

6DB6

(See chart for seldom-used tubes)

CBS

6DC6

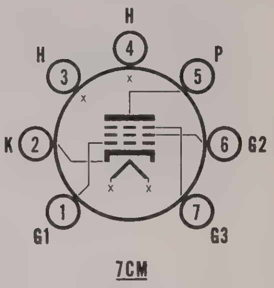


Gain-controlled i-f or r-f amplifier for color television receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	0.02	μμf
Input: g1 to k + h + g2 + g3 + i.s.	6.5	μμf
Output: p to k + h + g2 + g3 + i.s.	2.0	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 3 (suppressor) voltage	0	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	300	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	2.0	watts
Grid 2 dissipation	0.5	watt
Grid 1 circuit resistance		
Fixed bias	0.25	meg
Self bias	1.0	meg

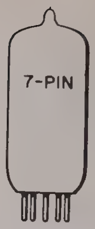
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	200	volts
Grid 3 (suppressor)	connected to cathode at socket	
Grid 2 (screen) voltage	150	volts
Plate resistance (approx.)	0.5	meg
Transconductance	5500	μmhos
Plate current	9.0	ma
Grid 2 current	3.0	ma
Grid 1 voltage (approx.) for $g_m = 50$ μmhos	−12.5	volts

CBS

6DE6

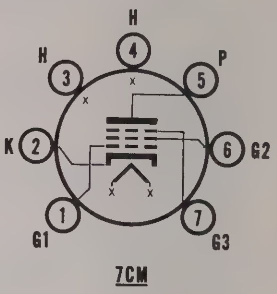


Controlled cutoff intermediate-frequency amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p, max.	0.025	.015	μμf
Input: g1 to k + h + g2 + g3 + i.s.	6.5	6.5	μμf
Output: p to k + h + g2 + g3 + i.s.	2.0	3.0	μμf

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design maximum values)

Plate voltage	330	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	330	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	2.3	watts
Grid 2 dissipation	0.55	watts

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	125	volts
Grid 3 (suppressor)	connected to cathode at socket	
Grid 2 (screen) voltage	125	volts
Cathode bias resistor	56	ohms
Plate resistance (approx.)	0.25	meg
Transconductance	8000	μmhos
Plate current	15.5	ma
Grid 2 current	4.2	ma
Grid 1 voltage (approx.) for $I_b = 20\ \mu a$	−9	volts
Grid 1 voltage for $g_m = 700\ \mu$mhos, $R_k = 0$	−5.5	volts

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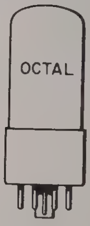
CBS

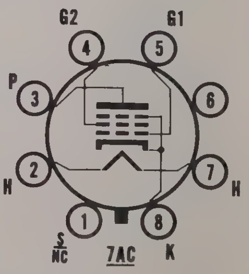
6DG6GT



Audio output amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.2	amps
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

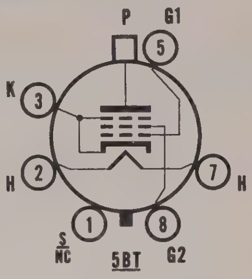


Type 6DG6GT is identical to type 6W6GT except for heater characteristics, maximum $E_b = 200$ volts, and maximum $E_{c2} = 125$V and no vertical amplifier ratings.

CBS

6DN6

Horizontal deflection amplifier for TV receivers having low B supply voltage



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	2.5	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.8	μμf
Input: g1 to k + h + g2 + b.p.	22	μμf
Output: p to k + h + g2 + b.p.	11.5	μμf

MAXIMUM RATINGS (Design center values unless noted)

Horizontal Deflection Amplifier*

Plate supply voltage, d-c (boost + d-c power supply)	700	volts
Plate voltage, peak pos. (absolute max.)	6600	volts
Plate voltage, peak negative pulse	1500	volts
Grid 2 voltage, d-c	175	volts
Grid 1 voltage, peak negative	200	volts
Plate dissipation†	15	watts
Grid 2 dissipation	3.0	watts
Cathode current, average	200	ma
Cathode current, peak	700	ma
Grid 1 circuit resistance	0.47	meg
Bulb temperature at hottest point	225	°C

AVERAGE CHARACTERISTICS

	Instantaneous values		
Plate voltage	50	125	volts
Grid 2 (screen) voltage	100	125	volts
Grid 1 (control-grid) voltage	0	—18	volts
Plate resistance (approx.)		4000	ohms
Transconductance		9000	μmhos
Plate current	240	70	ma
Grid 2 current	30	6.3	ma
Grid 1 voltage (approx.) for $I_b = 0.5$ ma		—36	volts
Triode amplification factor (p + g2 tied together)		4.35	

NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

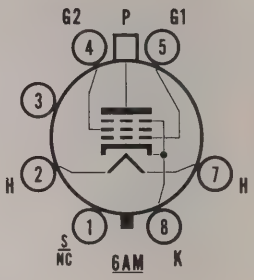
†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

CBS

6DQ6

6DQ6A

High efficiency horizontal deflection amplifier for television receivers



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.2	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.55	μμf
Input: g1 to k + h + g2 + b.p.	15	μμf
Output: p to k + h + g2 + b.p.	7	μμf

MAXIMUM RATINGS (Design center values unless noted)

Horizontal Deflection Amplifier*	**6DQ6**	**6DQ6A**	
Plate supply voltage, d-c (boost + d-c power supply)	550	700	volts
Plate voltage, peak pos. (absolute max.)	6000	6000	volts
Plate voltage, peak negative pulse	1375	1375	volts
Grid 2 voltage, d-c	175	200	volts
Grid 1 voltage, d-c	—	—50	volts
Grid 1 voltage, peak negative	300	300	volts
Plate dissipation†	15	15	watts
Grid 2 dissipation	2.5	3	watts
Cathode current, average	120	140	ma
Cathode current, peak	440	440	ma
Grid 1 circuit resistance	0.47	1.0‡	meg
Bulb temperature at hottest point	220	220	°C

AVERAGE CHARACTERISTICS	**Instantaneous values**		
Plate voltage	60	250	volts
Grid 2 (screen) voltage	150	150	volts
Grid 1 (control-grid) voltage	0	—22.5	volts
Plate resistance (approx.)		20,000	ohms
Transconductance			
6DQ6A		6600	μmhos
6DQ6		6000	μmhos
Plate current	300	75	ma
Grid 2 current	27	2.4	ma
Grid 1 voltage (approx.) for I_b = 1 ma			
6DQ6A		—46	volts
6DQ6		—50	volts

Triode Connected

Plate and grid 2 voltage (p + g2 tied together)	150	volts
Grid 1 voltage	—22.5	volts
Amplification factor	4.1	

6DQ6 • 6DQ6A (cont.)

TYPICAL OPERATION

Horizontal Deflection for 70° Picture Tube*

Plate supply voltage (boost + d-c supply)	465	volts
Plate voltage, peak positive (d-c + pulse)	3440	volts
Grid 2 (screen) voltage	140	volts
Grid 1 (control-grid) voltage, d-c	−28	volts
Grid 1 (control-grid) input voltage		
Sawtooth component, peak to peak	74	volts
Negative peaking component	18	volts
Plate current	83	ma
Grid 2 (screen) current	12.3	ma
Plate dissipation	5.1	watts
Grid 1 resistance	0.33	meg
Anode voltage of CRT	14	kv

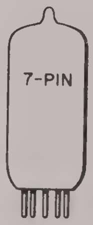
NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

‡Grid resistor-bias operation.

CBS 6DT6

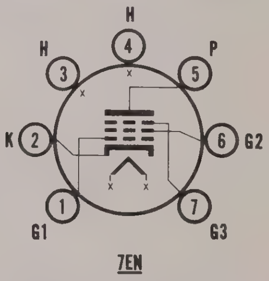


Dual controlled pentode for f-m detector and limiter, mixer, or gain-controlled amplifier use

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



Type 6DT6 is identical to type 3DT6 except for heater characteristics.

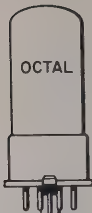
6E5 • 6E6 • 6E7 • 6F4 • 6F5/G/GT • 6F6/G/GT • 6F7/S • 6F8G 6G5 • 6G6G • 6H4/GT • 6H5

(See chart for seldom-used tubes)

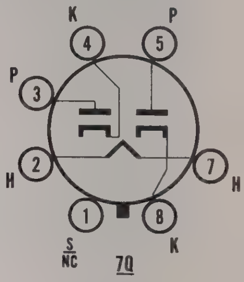
CBS

6H6GT

6H6



R-f detector, phase detector, or low power rectifier



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	0.3	amp
Peak heater-cathode voltage, max.	330	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES	6H6	6H6GT	
Plate (Sect. 1) to cathode (Sect. 1)	3.0	3.0	$\mu\mu$f
Plate (Sect. 2) to cathode (Sect. 2)	3.4	4.0	$\mu\mu$f
Plate (Sect. 1) to plate (Sect. 2)	0.10	0.10	$\mu\mu$f

MAXIMUM RATINGS (Design center values)

Rectifier Service

Plate voltage, peak inverse	420	volts
Plate supply voltage, rms (each plate)*	150	volts
Output current, d-c*	8	ma
Plate current, peak steady state (each plate)	48	ma
Plate supply impedance, total effective (each plate)*	40	ohms

Voltage Doubler	Half-Wave	Full-Wave	
Plate voltage, rms	117	117	volts
Plate supply impedance, total effective	30	15	ohms
Output current, d-c	8.0	8.0	ma

NOTE:

*Ratings are for half-wave connection.

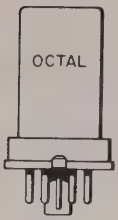
6J4

(See chart for seldom-used tubes)

CBS

6J5

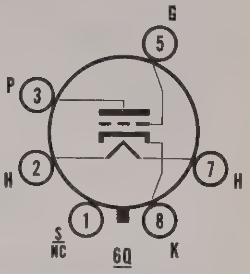
6J5GT



Audio voltage amplifier, phase inverter, or general purpose amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES	6J5	6J5GT♦	
Grid to plate: g1 to p	3.4	3.8	μμf
Input: g1 to k + h	3.4	4.2	μμf
Output: p to k + h	3.6	5.0	μμf

♦JETEC shield 308 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Control-grid voltage	0	volts
Plate dissipation	2.5	watts
Cathode current	20	ma
Control-grid circuit resistance	1.0	meg

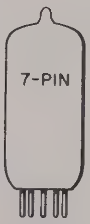
CHARACTERISTICS AND TYPICAL OPERATION
Class A Amplifier

Plate voltage	90	250	volts
Control-grid voltage	0	−8	volts
Plate resistance (approx.)	6700	7700	ohms
Transconductance	3000	2600	μmhos
Amplification factor	20	20	
Plate current	10	9	ma

CBS

6J6

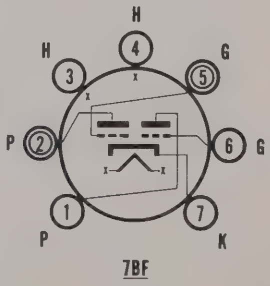
6J6A



Very high frequency oscillator, amplifier, or mixer

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode	100	volts



6J6A

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

Types 6J6 and 6J6A are identical to types 5J6 and 19J6 except for heater characteristics. See 5J6 for characteristics and ratings.

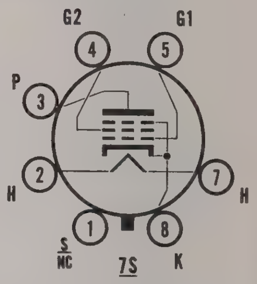
CBS 6K6GT

Audio power output amplifier or television vertical deflection amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	400	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.5	μμf
Input: g1 to k + h + g2 + g3	5.5	μμf
Output: p to k + h + g2 + g3	6.0	μμf

MAXIMUM RATINGS

(Design center values unless noted)

	Class A Amplifier	Vertical Deflection Amplifier*	
Plate voltage	315	315	volts
Grid 2 voltage	285		volts
Plate voltage, peak positive (absolute max.)†		1200	volts
Control grid voltage, peak negative		−250	volts
Plate dissipation	8.5	7.0	watts
Grid 2 dissipation	2.8		watts
Cathode current, average		25	ma
Cathode current, peak		75	ma
Grid circuit resistance			
Fixed bias	0.1		meg
Cathode bias	0.5	2.2	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier (Single Tube)

Plate voltage	100	250	315	volts
Grid 2 (screen) voltage	100	250	250	volts
Grid 1 (control-grid) voltage	−7	−18	−21	volts
Grid 1 input voltage, peak a-f	7	18	21	volts
Plate current, zero signal	9	32	25.5	ma
Plate current, maximum signal	9.5	33	28	ma
Grid 2 current, zero signal	1.6	5.5	4.0	ma
Grid 2 current, maximum signal	3	10	9	ma
Load resistance impedance	12,000	7600	9000	ohms
Total harmonic distortion (approx.)	11	11	15	%
Power output, maximum signal	0.35	3.4	4.5	watts

6K6GT (cont.)

Class A Push-Pull Amplifier (Values for two tubes)	**Fixed Bias**	**Cathode Bias**	
Plate voltage	285	285	volts
Grid 2 (screen) voltage	285	285	volts
Grid 1 (control-grid) voltage	—25.5		volts
Cathode bias resistor		400	ohms
Grid-to-grid input voltage, peak a-f	51	51	volts
Plate current, zero signal	55	55	ma
Plate current, maximum signal	72	61	ma
Grid 2 current, zero signal	9	9	ma
Grid 2 current, maximum signal	17	13	ma
Load resistance, plate-to-plate	12,000	12,000	ohms
Total harmonic distortion (approx.)	6	4	%
Power output, maximum signal	10.5	9.8	watts

Triode Connected

Plate and grid 2 voltage (p + g2 tied together)	250	volts
Grid 1 voltage	—18	volts
Plate resistance	2500	ohms
Transconductance	2700	µmhos
Plate current, zero signal	37.5	ma
Amplification factor	6.8	
Grid voltage (approx.) for $I_b = 0.5$ ma	—48	volts

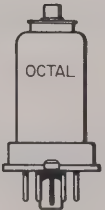
NOTES:

*Triode connected; grid 2 tied to plate.

†Voltage pulse duration must not exceed 2500 µs in a 525-line, 30-frame system.

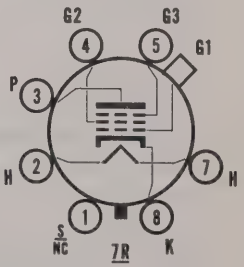
CBS

6K7



6K7G • 6K7GT

Gain controlled i-f or r-f amplifier for radio receivers



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	6K7♦	6K7G▲	6K7GT▲	
Grid to plate: g1 to p, max.	.005	.007	0.005	µµf
Input: g1 to k + h + g2 + g3	7.0	5.0	4.6	µµf
Output: p to k + h + g2 + g3	12	12	12	µµf

♦With shell connected to cathode.

▲With close-fitting shield connected to cathode.

6K7 • 6K7G • 6K7GT (cont.)

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	125	volts
Grid 2 supply voltage	300	volts
Grid voltage	0	volts
Plate dissipation	2.75	watts
Grid 2 dissipation	0.35	watt

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	100	250	250	volts
Grid 3 (suppressor)	connected to cathode at socket			
Grid 2 (screen) voltage	100	100	125	volts
Grid 1 (control-grid) voltage	−1.0	−3.0	−3.0	volts
Plate resistance (approx.)	0.15	0.8	0.6	meg
Transconductance	1650	1450	1650	μmhos
Plate current	9.5	7.0	10.5	ma
Grid 2 current	2.7	1.7	2.6	ma
Grid 1 voltage (approx.) for $g_m = 2$ μmhos	−38.5	−42.5	−52.5	volts

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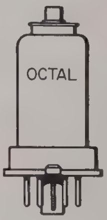
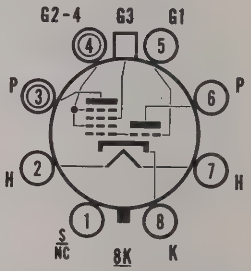
CBS

6K8



6K8G • 6K8GT

Combined triode oscillator and hexode mixer in radio receivers



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Hexode plate voltage	300	volts
Hexode grid 2 and 4 voltage	150	volts
Hexode grid 2 and 4 supply voltage	300	volts
Hexode grid 3 voltage, negative d-c	0	volts
Triode plate voltage	125	volts
Hexode grid 2 and 4 dissipation	0.7	watt
Hexode plate dissipation	0.75	watt
Triode plate dissipation	0.75	watt
Cathode current, total	16	ma

6K8 • 6K8G • 6K8GT (cont.)

CHARACTERISTICS AND TYPICAL OPERATION

Converter Service (Separate excitation)

Hexode plate voltage	100	250	volts
Hexode screen (grids 2 & 4) voltage	100	100	volts
Hexode control-grid (grid 3) voltage	−3	−3	volts
Hexode plate resistance (approx.)	0.4	0.6	meg
Hexode plate current	2.3	2.5	ma
Hexode screen current	6.2	6.0	ma
Triode plate voltage	100	100	volts
Triode grid resistor	50,000	50,000	ohms
Triode plate current	3.8	3.8	ma
Triode grid and hexode grid 1 current	0.15	0.15	ma
Conversion transconductance	325	350	μmhos
Conversion transconductance with hexode grid 3 bias = −30 volts (approx.)	2	2	μmhos
Cathode current, total	12.5	12.5	ma

Oscillator Characteristics, Not Oscillating

Plate voltage	100	volts

6L5G

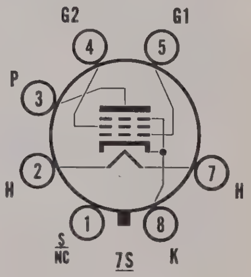
(See chart for seldom-used tubes)

CBS

6L6

6L6G • 6L6GA
6L6GB

Audio output tube with high power, high sensitivity, and high efficiency



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	900	ma
Peak heater-cathode voltage, max.	180	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.4	μμf
Input: g1 to k + h + g2 + b.p.	10	μμf
Output: p to k + h + g2 + b.p.	12	μμf

6L6 • 6L6G • 6L6GA • 6L6GB (cont.)

MAXIMUM RATINGS

(Design center values)	Triode connected*	Pentode	
Plate voltage	275	360	volts
Grid 2 voltage	275	270	volts
Plate dissipation	19	19	watts
Grid 2 dissipation		2.5	watts
Grid circuit resistance			
Fixed bias	0.1	0.1	meg
Self bias	0.5	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Triode*	Pentode			
Plate voltage	250	250	300	350	volts
Grid 2 voltage	Plate	250	200	250	volts
Grid 1 voltage	−20	−14	−12.5	−18	volts
Plate resistance	1700	22,500	35,000	33,000	ohms
Transconductance	4700	6000	5300	5200	μmhos
Grid 1 input voltage, peak a-f	20	14	12.5	18	volts
Plate current, zero signal	40	72	48	54	ma
Plate current, max. signal	44	79	55	66	ma
Grid 2 current, zero signal	—	5	2.5	2.5	ma
Grid 2 current, max. signal	—	7.3	4.7	7.0	ma
Load resistance impedance	5000	2500	4500	4200	ohms
Total harmonic distortion	5	10	11	15	%
Power output, max. signal	1.4	6.5	6.5	10.8	watts

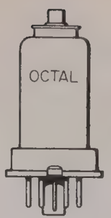
Push-Pull Amplifier (Values for two tubes)

	Class A1		Class AB1		Class AB2		
Plate voltage	250	270	360	360	360	360	volts
Grid 2 voltage	250	270	270	270	225	270	volts
Grid 1 voltage	−16	−17.5	−22.5	−22.5	−18.0	−22.5	volts
Plate resistance, per tube	24,500	23,500					ohms
Transconductance, per tube	5500	5700					μmhos
Grid-to-grid input voltage, peak a-f	32	35	45	45	52	72	volts
Plate current, zero signal	120	134	88	88	78	88	ma
Plate current, max. signal	140	155	132	140	142	205	ma
Grid 2 current, zero signal	10	11	5	5	3.5	5	ma
Grid 2 current, max. signal	16	17	15	11	11	16	ma
Load resistance, plate-to-plate	5000	5000	6600	3800	6000	3800	ohms
Total harmonic distortion	2	2	2	2	2	2	%
Power output	14.5	17.5	26.5	18	31	47	watts

*Grid 2 tied to plate

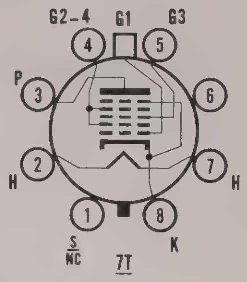
CBS

6L7



6L7G

Dual control heptode for r-f mixer or automatic volume expander circuits



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma

ELECTRICAL DATA

MAXIMUM RATINGS **(Design center values)**	**Class A_1 Amplifier**	**Mixer**	
Plate voltage	300	300	volts
Grid 2 and 4 voltage	100	150	volts
Screen dissipation	1.0	1.5	watts
Plate dissipation	1.5	1.0	watts

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	250	volts
Grid 2 and 4 (screen grid) voltage	100	volts
Grid 1 and 3 (control-grid) voltage	—3.0	volts
Plate resistance	0.6	meg
Transconductance (grid 1 to plate)	1100	µmhos
Transconductance with g1 and g3 = —15 volts	5.0	µmhos
Plate current	5.3	ma
Screen current	6.5	ma

Mixer

Plate voltage	250	250*	volts
Grid 2 and 4 (screen grid) voltage	100	150*	volts
Grid 1 (signal-grid) voltage	—3.0	—6.0*	volts
Grid 3 (oscillator-grid) voltage†	—10.0	—15.0	volts
Grid 3 voltage, peak	12	18	volts
Plate resistance	>1	>1	meg
Conversion transconductance	375	350	µmhos
Conversion transconductance	5.0▲	5.0△	µmhos
Plate current	2.4	3.3	ma
Screen current	7.1	9.2	ma

NOTES:

*These values are recommended for multi-range receiver applications.

†D-c resistance in grid 3 circuit should not exceed 50,000 ohms.

▲Grid 1 bias=—30 volts.

△Grid 1 bias=—45 volts.

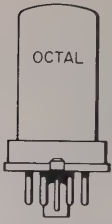
6N4 • 6N6G

(See chart for seldom-used tubes)

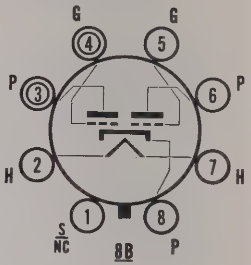
CBS

6N7

6N7GT



Push-pull class B triode power amplifier



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	800	ma

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)	Class A Amplifier (Driver)*	Class B Power Amplifier	
Plate voltage, d-c	300	300	volts
Plate dissipation (each plate)	1.0	5.5	watts
Plate current, peak (each plate)		125	ma

CHARACTERISTICS AND TYPICAL OPERATION

Class B Power Amplifier

Plate voltage	300	300	volts
Control-grid voltage	0	0	volts
Grid-to-grid voltage, peak a-f†	58	82	volts
D-c plate current, zero signal	35	35	ma
D-c plate current, maximum signal	70	70	ma
Grid current, peak (each unit)	20	22	ma
Plate supply impedance	0	1000	ohms
Grid circuit impedance, effective (each unit)	0	516†	ohms
Load resistance, effective (plate-to-plate)	8000	8000	ohms
Total harmonic distortion	4	8	%
Third harmonic distortion	3.5	7.5	%
Fifth harmonic distortion	1.5	2.5	%
Power output, maximum signal	10	10	watts

Class A Amplifier (Driver)*

Plate voltage	250	294	volts
Control-grid voltage	−5.0	−6.0	volts
Plate resistance	11,300	11,000	ohms
Transconductance	3100	3200	μmhos
Plate current	6.0	7.0	ma
Plate load resistance	between 20,000 and 40,000		ohms
Amplification factor	35	35	
Power output (approx.)	400	400	mw

NOTES:

*Both grids and plates connected together at socket.

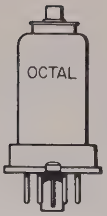
†Consists of 500 ohms effective resistance and 50 mh leakage reactance.

6P5GT • 6P7G • 6Q4
6Q6/G/6T7G

(See chart for seldom-used tubes)

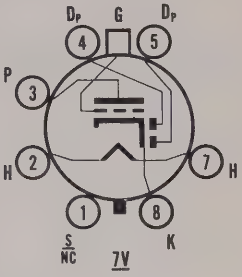
CBS

6Q7



6Q7G • 6Q7GT

Combined detector, avc, and audio amplifier for a-m radio receivers



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.	90	volts

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Diode current (min.) with 10 volts applied to each plate	0.8	ma
Diode current (max.), each plate, continuous operation	1.0	ma

CHARACTERISTICS AND TYPICAL OPERATION*

Class A Amplifier (Triode Unit)

Plate voltage	100	250	volts
Control-grid voltage	—1.0	—3.0	volts
Plate resistance (approx.)	.058	.058	meg
Transconductance	1200	1200	μmhos
Amplification factor	70	70	
Plate current	0.8	1.0	ma

NOTES:

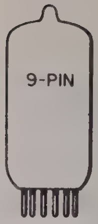
*The two diode plates are placed around the cathode and are independent of the triode unit except for the common cathode.

6R6G • 6R7/G/GT • 6R8

(See chart for seldom-used tubes)

CBS

6S4



6S4A

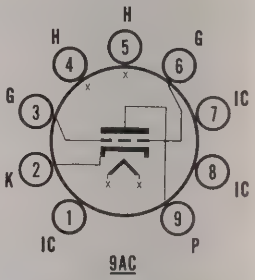
Vertical deflection output amplifier for television receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time†	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component 100 volts max.
†Applies only to 6S4A



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	2.6	μμf
Input: g1 to k + h	4.2	μμf
Output: p to k + h	0.9	μμf

MAXIMUM RATINGS (Design center values unless noted)*

Plate voltage, d-c	500	volts
Plate voltage, peak pos. (absolute max.)	2200	volts
Control-grid voltage, peak negative pulse	250	volts
Plate dissipation	7.5	watts
Cathode current, average	30	ma
Cathode current, peak	105	ma
Control-grid circuit resistance, cathode bias	2.2	meg

AVERAGE CHARACTERISTICS

Class A Amplifier

Plate voltage	250	volts
Control-grid voltage	—8.0	volts
Plate resistance (approx.)	3600	ohms
Transconductance	4500	μmhos
Amplification factor	16	
Plate current	26	ma
Grid 1 voltage (approx.) for $I_b = 50\ \mu a$	—23	volts
Plate current (approx.) for $E_{c1} = -15$ volts	4.5	ma

NOTES:

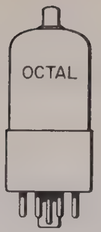
*Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

6S7/G

(See chart for seldom-used tubes)

CBS

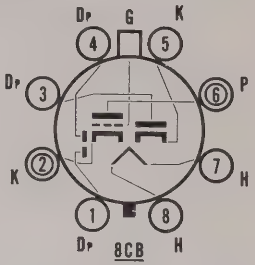
6S8GT



Combined a-m, f-m detector and audio amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts


Dp
G
K
4
5
Dp
3
6
P
K
2
7
H
1
8
Dp
8CB
H

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Plate dissipation	0.5	watt
Plate current (each diode)	1.0	ma

CHARACTERISTICS AND TYPICAL OPERATION

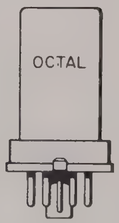
Class A Amplifier

Plate voltage	50	100	250	volts
Control-grid voltage	0	—1	—2	volts
Control-grid resistor	10	—	—	meg
Plate resistance (approx.)	.285	.11	.091	meg
Transconductance	300	900	1100	μmhos
Amplification factor	85	100	100	
Plate current	.07	0.4	0.9	ma

CBS

6SA7

6SA7G • 6SA7GT

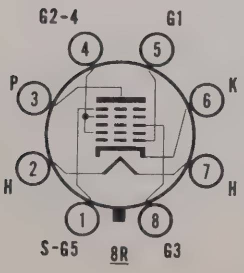


Pentagrid converter for radio receivers

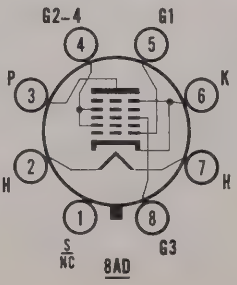
ATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma

6SA7


G2-4
G1
4
5
P
3
6
K
2
7
H
H
1
8
S-G5
8R
G3

6SA7G • 6SA7GT


G2-4
G1
4
5
P
3
6
K
2
7
H
H
1
8
S
NC
8AD
G3

6SA7 • 6SA7G • 6SA7GT (cont.)

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 and 4 voltage	100	volts
Grid 2 and 4 supply voltage	300	volts
Grid 3 voltage, negative d-c	50	volts
Grid 3 voltage, positive d-c	0	volts
Grid 2 dissipation	1.0	watt
Plate dissipation	1.0	watt
Cathode current, total	14	ma

CHARACTERISTICS AND TYPICAL OPERATION

Converter Service (Separate excitation)	Self Excitation*		Separate Excitation		
Plate voltage	100	250	100	250	volts
Grid 3 (signal grid) voltage	0	0	—2	—2	volts
Grid 2 and 4 (oscillator anode) voltage	100	100	100	100	volts
Grid 1 (oscillator grid) resistor	20,000	20,000	20,000	20,000	ohms
Plate resistance (approx.)	0.5	1.0	0.5	1.0	meg
Conversion transconductance	425	450	425	450	μmhos
Cathode current, total	12.3	12.5	12.3	12.5	ma
Plate current	3.3	3.5	3.3	3.5	ma
Grid 2 and 4 (oscillator anode) current	8.5	8.5	8.5	8.5	ma
Grid 1 (oscillator grid) current	0.5	0.5	0.5	0.5	ma
Conversion transconductance with $E_{c3} = -35V$	2	2	2	2	μmhos

NOTES:

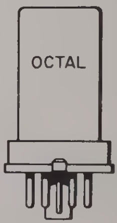
*Values are approximate and are for a Hartley circuit having a feedback of about 2 volts peak in the cathode circuit.

6SB7Y

(See chart for seldom-used tubes)

CBS

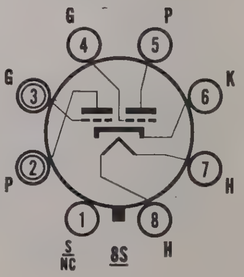
6SC7



Audio voltage amplifier or phase inverter

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES♦

	Section 1	Section 2	
Grid to plate: g1 to p	2.0	2.0	μμf
Input: g1 to k + h + shell	2.0	2.0	μμf
Output: p to k + h + shell	3.0	3.0	μμf

♦With pin 1 connected to pin 6.

MAXIMUM RATINGS (Design center values)

Plate voltage	250	volts

CHARACTERISTICS AND TYPICAL OPERATION
Class Amplifier (Each section)

Plate voltage	250	volts
Control-grid voltage	—2.0	volts
Plate resistance (approx.)	.053	meg
Transconductance	1325	μmhos
Amplification factor	70	
Plate current	2.0	ma

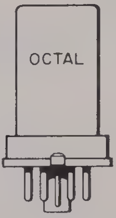
6SD7GT • 6SE7GT • 6SF5/GT 6SF7

(See chart for seldom-used tubes)

CBS

6SG7

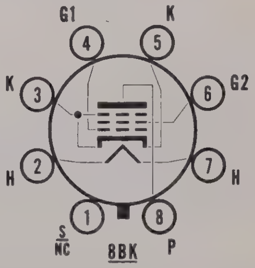
6SG7GT



Radio frequency or intermediate frequency amplifier capable of high frequency operation

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES♦

Grid to plate: g1 to p, max.	0.003	μμf
Input: g1 to k + h + g2 + g3	8.5	μμf
Output: p to k + h + g2 + g3	7.0	μμf

♦Shell connected to cathode.

6SG7 • 6SG7GT (cont.)

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	200	volts
Grid 2 supply voltage	300	volts
Grid 1 voltage	0	volts
Plate dissipation	3.0	watts
Grid 2 dissipation	0.6	watt

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	100	250	250	volts
Grid 3 (suppressor)	connected to cathode at socket			
Grid 2 (screen) voltage	100	125	150	volts
Grid 1 (control-grid) voltage	−1.0	−1.0	−2.5	volts
Plate resistance (approx.)	0.25	0.9	>1.0	meg
Transconductance	4100	4700	4000	μmhos
Plate current	8.2	11.8	9.2	ma
Grid 2 current	3.2	4.4	3.4	ma
Grid 1 voltage (approx.) for $g_m = 40$ μmhos	−11.5	−14	−17.5	volts

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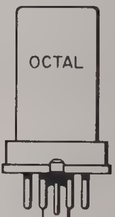
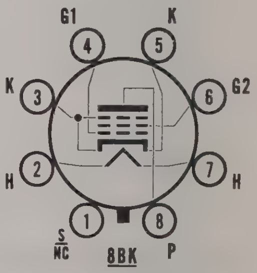
6SH7



R-f or i-f amplifier and f-m limiter capable of high frequency operation

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES♦

Grid to plate: g1 to p, max.	0.003	μμf
Input: g1 to k + h + g2 + g3	8.5	μμf
Output: p to k + h + g2 + g3	7.0	μμf

♦With shell connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	150	volts
Grid 2 supply voltage	300	volts
Grid 1 voltage	0	volts
Plate dissipation	3.0	watts
Grid 2 dissipation	0.7	watt

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	100	250	volts
Grid 2 (screen) voltage	100	150	volts
Grid 1 (control-grid) voltage	−1	−1	volts
Plate resistance (approx.)	0.35	0.9	meg
Transconductance	4000	4900	μmhos
Plate current	5.3	10.8	ma
Grid 2 current	2.1	4.1	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−4.0	−5.5	volts

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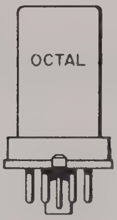
CBS

6SJ7

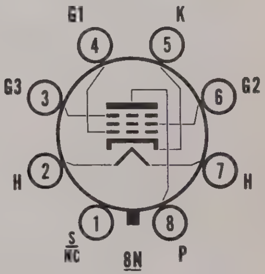
6SJ7GT



R-f amplifier, biased detector, or audio amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	6SJ7♦	6SJ7GT♦♦	
Grid to plate: g1 to p, max.	0.005	0.005	μμf
Input: g1 to k + h + g2 + g3	6.0	7.0	μμf
Output: p to k + h + g2 + g3	7.0	7.0	μμf

♦Shell connected to cathode.

♦♦JETEC shield 308 connected to cathode.

MAXIMUM RATINGS (Design center values)

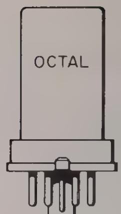
Plate voltage	300	volts
Grid 2 voltage	125	volts
Grid 2 supply voltage	300	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	2.5	watts
Grid 2 dissipation	0.7	watt

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

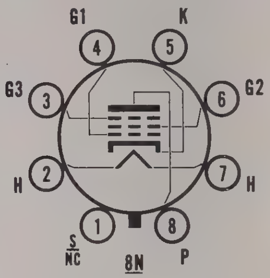
Plate voltage	100	250	volts
Grid 3 (suppressor)	connected to cathode at socket		
Grid 2 (screen) voltage	100	100	volts
Grid 1 (control-grid) voltage	−3	−3	volts
Plate resistance (approx.)	0.7	1.0	meg
Transconductance	1575	1650	μmhos
Plate current	2.9	3.0	ma
Grid 2 current	0.9	0.8	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−8	−8	volts

CBS 6SK7



6SK7GT

Gain-controlled r-f or i-f amplifier in radio receivers



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	6SK7♦	6SK7GT♦♦	
Grid to plate: g1 to p, max.	0.003	0.005	μμf
Input: g1 to k + h + g2 + g3	6.0	6.5	μμf
Output: p to k + h + g2 + g3	7.0	7.5	μμf

♦Shell connected to cathode.

♦♦JETEC shield 308 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	125	volts
Grid 2 supply voltage	300	volts
Grid 1 voltage	0	volts
Plate dissipation	4.0	watts
Grid 2 dissipation	0.4	watt

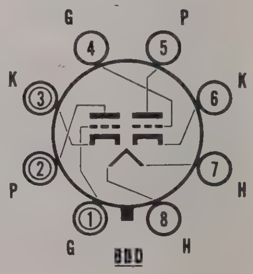
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	100	250	volts
Grid 3 (suppressor)	connected to cathode at socket		
Grid 2 (screen) voltage	100	100	volts
Grid 1 (control-grid) voltage	−1.0	−3.0	volts
Plate resistance (approx.)	0.12	0.8	meg
Transconductance	2350	2000	μmhos
Plate current	13	9.2	ma
Grid 2 current	4.0	2.6	ma
Grid 1 voltage (approx.) for $g_m = 10$ μmhos	−35	−35	volts

CBS 6SL7GT

Phase inverter or resistance-coupled amplifier in audio service



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

6SL7GT (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES — Shield♦

	Section 1	Section 2	
Grid to plate: g1 to p	2.8	2.8	μμf
Input: g1 to k + h	3.0	3.4	μμf
Output: p to k + h	3.8	3.2	μμf

♦JETEC shield 308 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Control-grid voltage, positive d-c	0	volts
Plate dissipation	1.0	watt

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	250	volts
Control-grid voltage	—2.0	volts
Plate resistance (approx.)	44,000	ohms
Transconductance	1600	μmhos
Amplification factor	70	
Plate current	2.3	ma

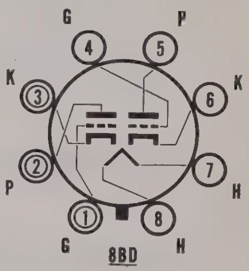
CBS

6SN7GT

6SN7GTA • 6SN7GTB

TV sweep oscillator and vertical amplifier; phase inverter and R-C amplifier

HEATER CHARACTERISTICS



Voltage, a-c or d-c	6.3	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

Warm-up time, 6SN7GTB only, 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	6SN7GT		6SN7GTA & 6SN7GTB		
	Section 1	Section 2	Section 1	Section 2	
Grid to plate: g1 to p	3.8	4.0	4.0	3.8	μμf
Input: g1 to k + h	2.8	3.0	2.2	2.6	μμf
Output: p to k + h	0.8	1.2	0.7	0.7	μμf

6SN7GT • 6SN7GTA • 6SN7GTB (cont.)

MAXIMUM RATINGS
(Design center values unless noted)

	6SN7GTA and 6SN7GTB		
	Class A Amplifier	Vertical Deflection Amplifier*	
Plate voltage, d-c	450	450	volts
Plate voltage, peak pos. (absolute max.)		1500	volts
Control-grid voltage, peak negative		250	volts
Plate dissipation (each plate)	5.0	5.0	watts
Plate dissipation (total for both plates)	7.5	7.5	watts
Cathode current, avg	20	20	ma
Cathode current, peak		70	ma
Control-grid circuit resistance			
Fixed bias	1.0		meg
Self bias		2.2	meg

	6SN7GT▲		
	Class A Amplifier	Vertical Deflection Amplifier*	
Plate voltage, d-c	300	300	volts
Plate voltage, peak positive (absolute max.)		1200	volts
Plate dissipation (each plate)	3.5	3.5	watts
Plate dissipation (total for both plates)	5.0	5.0	watts

CHARACTERISTICS AND TYPICAL OPERATION

Plate voltage	90	250	volts
Control-grid voltage	0	−8.0	volts
Plate resistance (approx.)	6700	7700	ohms
Transconductance	3000	2600	μmhos
Amplification factor	20	20	
Plate current	10	9	ma
Plate current for $E_{c1} = 12.5$ volts		1.3	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−7	−18	volts

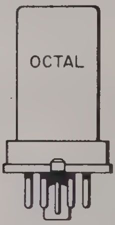
NOTES:

*Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

▲With the exception of the values listed, type 6SN7GT has the same maximum ratings as types 6SN7GTA and 6SN7GTB.

CBS

6SQ7

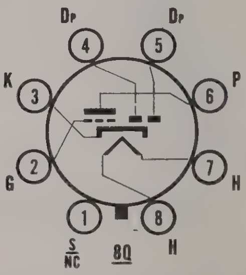


6SQ7G • 6SQ7GT

Combined detector, avc, and audio amplifier in radio receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode	6SQ7♦	6SQ7G/GT	
Grid to plate: g1 to p	1.6	1.8	μμf
Input: g1 to k + h	3.2	4.2	μμf
Output: p to k + h	3.0	3.4	μμf

♦With shell connected to cathode.

6SQ7 • 6SQ7G • 6SQ7GT (cont.)

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts

CHARACTERISTICS AND TYPICAL OPERATION

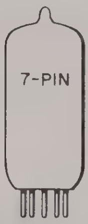
Class A Amplifier

Plate voltage	100	250	volts
Control-grid voltage	−1.0	−2.0	volts
Plate resistance (approx.)	0.11	.085	meg
Transconductance	925	1175	μmhos
Amplification factor	100	100	
Plate current	0.5	1.1	ma

6SR7GT • 6SS7 • 6ST7
6SU7GTY • 6SV7 • 6SZ7

(See chart for seldom-used tubes)

CBS 6T4

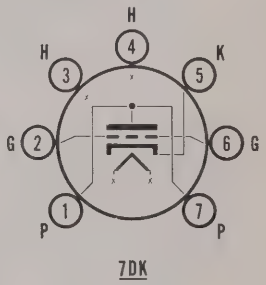


Local oscillator in ultra-high-frequency tuners

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	225	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	50	volts
Heater positive to cathode★	50	volts

★D-c component must not exceed 25 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES	No Shield	Shield♦	
Grid to plate: g1 to p	1.7	1.7	μμf
Input: g1 to k + h	3.3	2.9	μμf
Output: p to k + h	1.8	0.25	μμf
Heater to cathode: h to k*	2.9	3.0	μμf
Grid to cathode: g1 to k*	2.6	2.6	μμf
Plate to cathode: p to k*	0.18	0.20	μμf
Grounded grid operation			
Input	5.7	5.5	μμf
Output	3.4	1.8	μμf

♦JETEC shield 316 connected to cathode.

*Measured between specified elements only. When external shield is used, it should be grounded.

MAXIMUM RATINGS (Design center values)

Plate voltage	200	volts
Plate dissipation	3.5	watts
Cathode current	30	ma

CHARACTERISTICS

Plate voltage	80	volts
Cathode-bias resistor	150	ohms
Plate resistance (approx.)	1860	ohms
Transconductance	7000	μmhos
Amplification factor	13	
Plate current	18	ma
Control-grid voltage (approx.) for $I_b = 50$ μa	—15	volts

TYPICAL OPERATION

Oscillator at 950 Mc

Plate voltage	80	volts
Control-grid voltage (self-bias)	—4.0	volts
Control-grid resistance	10,000	ohms
Plate current	18	ma
Control-grid current	400	μa

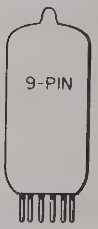
6T5 • 6T6 • 6T7G/6Q6G

(See chart for seldom-used tubes)

CBS

6T8

6T8A



Combined a-m, f-m detector and audio voltage amplifier

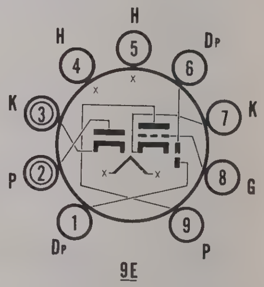
HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3		volts
Current	450		ma
Peak heater-cathode voltage, max.			
Heater negative	**6T8A**	**6T8**	
to cathode	100	200	volts
Heater positive to cathode	100	200★	volts

6T8A

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



Types 6T8 and 6T8A are identical to types 5T8 and 19T8 except for heater characteristics. See 5T8 for additional data.

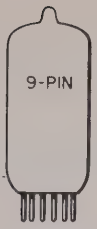
6U4GT • 6U5 • 6U6GT • 6U7G

(See chart for seldom-used tubes)

CBS

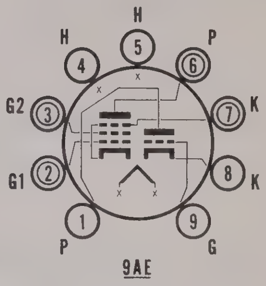
6U8

6U8A



Vhf triode oscillator and pentode mixer for TV tuners

HEATER CHARACTERISTICS



Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.

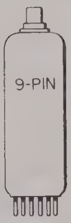
6U8A

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

Types 6U8 and 6U8A are identical to type 5U8 except for heater characteristics.

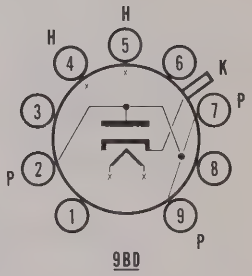
CBS

6V3A



Damping diode in television horizontal sweep circuits§

HEATER CHARACTERISTICS



Voltage	6.3	volts
Current	1.75	amps
Peak heater-cathode voltage, max.*		
Heater negative to cathode†♦	6750	volts
Heater positive to cathode★	300	volts

♦D-c compohent must not exceed 750 volts absolute max.

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Heater to cathode: h to k, max.	1.5	μμf
Cathode to plate-and-heater: k to p + h	9.0	μμf
Plate to cathode-and-heater: p to k + h	8.0	μμf

MAXIMUM RATINGS (Design center values unless noted)

TV Damper Service*▲

Plate voltage, peak inverse†	6000	volts
Plate current, d-c	135	ma
Plate current, peak	800	ma
Plate dissipation	2.7	watts

AVERAGE CHARACTERISTICS

Tube voltage drop at 250 ma	19	volts

NOTES:

§Type 6V3A is a replacement for type 6V3 which is identical except for bulb length.

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

▲Operation as a power rectifier of 6V3A is not recommended.

†Absolute maximum value.

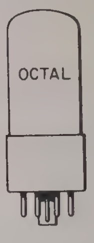
6V5G

(See chart for seldom-used tubes)

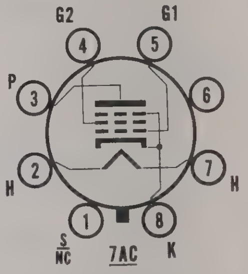
CBS

6V6GT

6V6 • 6V6GTA



Audio power amplifier with high output and high sensitivity



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma

6V6GTA

Warm-up time	11 secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

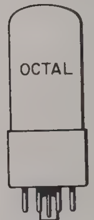
Types 6V6GT and 6V6GTA are identical to type 5V6GT except for heater characteristics. Type 6V6 is identical to the 6V6GT except that it has a metal envelope, JETEC outline 8-6.

6V7G • 6V8

(See chart for seldom-used tubes)

CBS

6W4GT



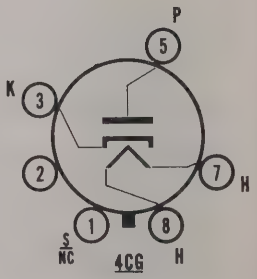
Damper diode in horizontal sweep circuits of television receivers

HEATER CHARACTERISTICS

Voltage	6.3	volts
Current	1.2	amps
Peak heater-cathode voltage, max.*		
Heater negative to cathode†♦	2300	volts
Heater positive to cathode★	300	volts

♦D-c component must not exceed 500 volts absolute max.

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Heater to cathode: h to k, max.	7.0	μμf
Cathode to plate-and-heater: k to p + h	13	μμf
Plate to cathode-and-heater: p to k + h	6.0	μμf

6W4GT (cont.)

MAXIMUM RATINGS (Design center values unless noted)

TV Damper Service*

Plate voltage, peak inverse†	3850	volts
Plate current, d-c	125	ma
Plate current, peak	750	ma
Plate dissipation	3.5	watts

AVERAGE CHARACTERISTICS

Tube voltage drop at 250 ma	21	volts

NOTES:

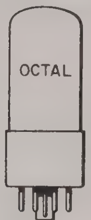
*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

†Absolute maximum value.

6W5G

(See chart for seldom-used tubes)

CBS 6W6GT

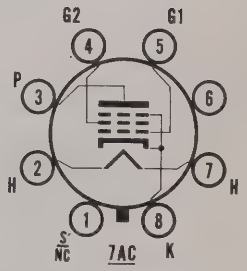


Audio output amplifier or television vertical deflection amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.2	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volt max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.8	μμf
Input: g1 to k + h + g2 + b.p.	15.0	μμf
Output: p to k + h + g2 + b.p.	9.0	μμf

MAXIMUM RATINGS (Design center values unless noted)

	Class A Amplifier	Vert. Deflection Amp.* Pentode	Triode‡	
Plate voltage	300	300	300	volts
Plate voltage, peak pos (absolute max.)		1500	1200	volts
Grid 2 voltage	150	150		volts
Grid 1 voltage, peak negative		250	250	volts
Plate dissipation	10	7.0	7.5†	watts
Grid 2 dissipation	1.25	1.0		watts
Cathode current, average		60	60	ma
Cathode current, peak		180	180	ma
Grid 1 circuit resistance				
Fixed bias	0.1			meg
Cathode bias	0.5	2.2	2.2	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier (Single tube)

Plate voltage	110	200	volts
Grid 2 (screen) voltage	110	125	volts
Grid 1 (control-grid) voltage	—7.5		volts
Cathode bias resistor		180	ohms
Plate resistance (approx.)	13,000	28,000	ohms
Transconductance	8000	8000	μmhos
Grid 1 input voltage, peak a-f	7.5	8.5	volts
Plate current, zero signal	49	46	ma
Plate current, maximum signal	50	47	ma
Grid 2 current, zero signal	4.0	2.2	ma
Grid 2 current, maximum signal	10	8.5	ma
Load resistance impedance	2000	4000	ohms
Total harmonic distortion (approx.)	10	10	%
Power output, maximum signal	2.1	3.8	watts

Triode Connected Characteristics‡

Plate voltage	225	volts
Grid 1 (control-grid) voltage	—30	volts
Plate resistance (approx.)	1600	ohms
Transconductance	3800	μmhos
Amplification factor	6.2	
Grid 1 voltage for $I_b = 0.5$ ma	—42	volts
Plate current	22	ma

NOTES:

*Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

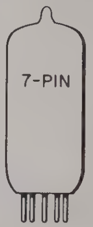
†Tube protection is needed for no-drive conditions, if grid-resistor bias is used.

‡Triode connected with screen tied to plate.

6W7G

(See chart for seldom-used tubes)

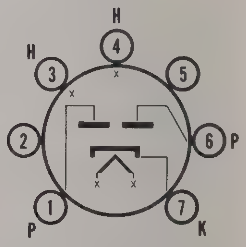
CBS 6X4



Full-wave power rectifier for automobile and a-c operated radios

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	0.6	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	450	volts
Heater positive to cathode	100	volts



5BS

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Rectifier Service

Plate voltage, peak inverse		1250	volts
Plate supply voltage, rms (each plate)	RATING CHART I*		
Output current, d-c	RATING CHART I*		
Plate current, peak steady state (each plate)	RATING CHART II*	210	ma
Plate current, peak transient (each plate)	RATING CHART III*	1.0	amp

6X4 (cont.)

CHARACTERISTICS

Tube Voltage Drop

Conducting 70 ma (each plate)	22	volts

TYPICAL OPERATION

Full-Wave Rectifier (Capacitor Input Filter)

Plate supply voltage, rms (each plate)	325	volts
Plate supply impedance (each plate)	525	ohms
Filter input capacitor	10	μf
Output current, d-c	70	ma
Output voltage at filter input, d-c		
At half-load current	365	volts
At full-load current	310	volts
Percentage regulation	15	%

Full-Wave Rectifier (Choke Input Filter)

Plate supply voltage, rms (each plate)	450	volts
Filter input choke	10	henrys
Output current, d-c	70	ma
Output voltage at filter input, d-c		
At half-load current	395	volts
At full-load current	385	volts
Percentage regulation	2.5	%

NOTES:

*Rating Charts given in APPENDIX.

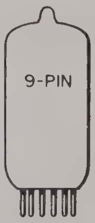
6X5GT

(See chart for seldom-used tubes)

CBS

6X8

6X8A

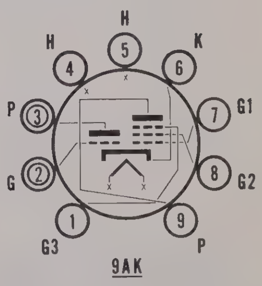


Combined vhf oscillator and mixer used in TV tuners

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode★	100	volts

★D-c component must not exceed 100 volts max.



6X8A

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

Types 6X8 and 6X8A are identical to type 5X8 except for heater characteristics. Similar but not identical types are the 5AT8, 6AT8, 5CG8 and 6CG8.

6Y3G • 6Y5/V

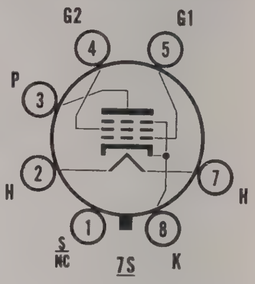
(See chart for seldom-used tubes)

CBS

6Y6GA

6Y6G

Audio output amplifier in equipment with low B+ voltage



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.25	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	180	volts
Heater positive to cathode	180	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.66	μμf
Input: g1 to k + h + g2 + b.p.	12	μμf
Output: p to k + h + g2 + b.p.	7.5	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	200	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	200	volts
Plate dissipation	12.5	watts
Grid 2 dissipation	1.75	watts
Grid 1 circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

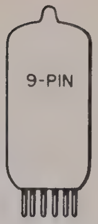
Class A Amplifier

Plate voltage	135	200	volts
Grid 2 (screen) voltage	135	135	volts
Grid 1 (control-grid) voltage	−13.5	−14	volts
Plate resistance (approx.)	9300	18,300	ohms
Transconductance	7000	7100	μmhos
Grid 1 input voltage, peak a-f	13.5	14	volts
Plate current, zero signal	58	61	ma
Plate current, maximum signal	60	66	ma
Grid 2 current, zero signal	3.5	2.2	ma
Grid 2 current, maximum signal	11.5	9	ma
Load resistance impedance	2000	2600	ohms
Total harmonic distortion (approx.)	3.6	6	%
Power output, maximum signal	10	10	watts

6Y7G·6Z3·6Z4·6Z4/84·6Z5 6Z5/12Z5·6Z7G·6ZY5G·7A4 7A5·7A6·7A7·7A8·7AB7 7AD7·7AF7·7AG7·7AH7·7AJ7

(See chart for seldom-used tubes)

CBS 7AU7



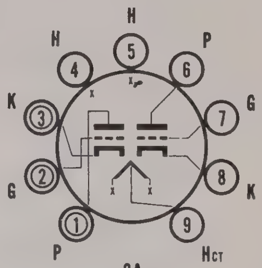
TV sweep oscillator and vertical amplifier or phase inverter, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

	Series	Parallel†	
Voltage, a-c or d-c	7.0	3.5	volts
Current	300	600	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode		200	volts
Heater positive to cathode★		200	volts

†Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component 100 volts max.



9A

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p	1.5	1.5	μμf
Input: g1 to k + h	1.6	1.8	μμf
Output: p to k + h			
Section 1	0.40	2.0	μμf
Section 2	0.32	2.0	μμf

♦JETEC shield 315 connected to cathode.

MAXIMUM RATINGS

(Design center values unless noted)■

	Class A Amplifier	Vertical Deflection Amplifier*	
Plate voltage, d-c	300	300	volts
Plate voltage, peak pos. (absolute max.)		1200	volts
Control-grid voltage, peak negative		250	volts
Plate dissipation (each plate)▲	2.75	2.75	watts
Cathode current, average	20	20	ma
Cathode current, peak		60	ma
Control-grid circuit resistance			
Fixed bias	0.25		meg
Cathode bias	1.0		meg

	Vertical Deflection Oscillator*	Horizontal Deflection Oscillator‡	
Plate voltage	300	300	volts
Plate dissipation (each plate)	2.75	2.75	watts
Control-grid voltage, peak negative	400	600	volts
Cathode current, average	20	20	ma
Cathode current, peak	60	300	ma
Control-grid circuit resistance	2.2	2.2	megs

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier■

Plate voltage	100	250	volts
Control-grid voltage	0	−8.5	volts
Plate resistance (approx.)	6500	7700	ohms
Transconductance	3100	2200	μmhos
Amplification factor	20	17	
Plate current	11.8	10.5	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$		−24	volts

NOTES:

*Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

‡Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

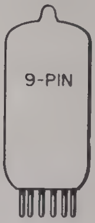
▲Tube protection is needed for no-drive conditions if grid-resistor bias is used.

■Each section.

7B4 • 7B5 • 7B6 • 7B7 • 7B8 • 7C4 7C5 • 7C6 • 7C7 • 7E5 • 7E6 • 7E7 7F7 • 7F8 • 7G7 • 7G8 • 7H7 • 7J7 7K7 • 7L7 • 7N7 • 7Q7 • 7R7 • 7S7 7T7 • 7V7 • 7W7 • 7Y4 • 7Y6 • 7X7/ XXFM • 7Z4

(See chart for seldom-used tubes)

CBS 8AU8



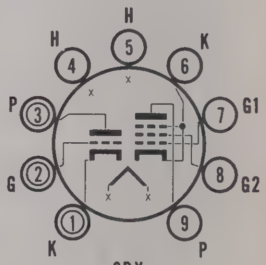
Combined sync amplifier, separator, or clipper, etc., and video or i-f amplifier, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	8.4	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

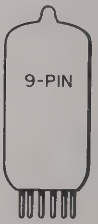
★D-c component must not exceed 100 volts max.



9DX

Type 8AU8 is identical to type 6AU8 except for heater characteristics. See type 6AU8 for ratings and operating characteristics.

CBS 8BA8A



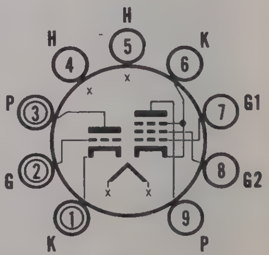
Combined sync separator or sync clipper, etc. and video amplifier, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	8.4	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

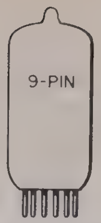
★D-c component must not exceed 100 volts max.



9DX

Type 8BA8A is identical to type 6BA8A except for heater characteristics. See type 6BA8A for ratings and operating characteristics.

8BH8

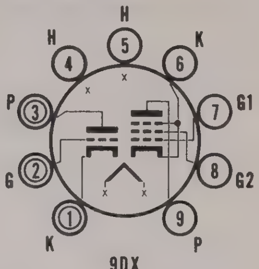


Combined sync separator, clipper, amplifier, or sweep oscillator, and i-f or video amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	8.4	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

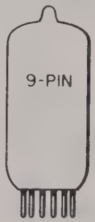
★D-c component must not exceed 100 volts max.



9DX

Type 8BH8 is identical to type 6BH8 except for heater characteristics. See type 6BH8 for ratings and operating characteristics.

8CG7

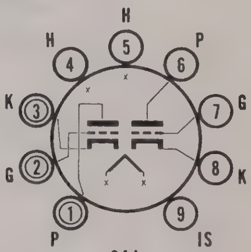


Amplifier or television sweep oscillator, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	8.4	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

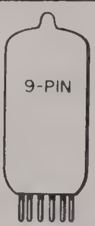
★D-c component must not exceed 100 volts max.



9AJ

Type 8CG7 is identical to type 6CG7 except for heater characteristics. See type 6CG7 for ratings and operating characteristics.

8CM7

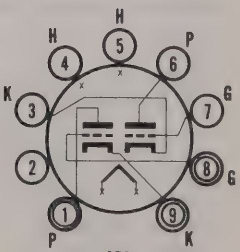


Combined vertical deflection oscillator and amplifier with dissimilar sections

HEATER CHARACTERISTICS

Voltage, a-c or d-c	8.4	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

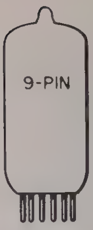
★D-c component must not exceed 100 volts max.



9ES

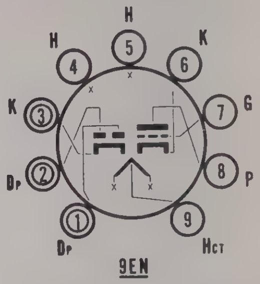
Type 8CM7 is identical to type 6CM7 except for heater characteristics. See type 6CM7 for ratings and operating characteristics.

8CN7



Combined horizontal phase detector and reactance tube in TV, or triode for audio or sync service

HEATER CHARACTERISTICS



	Series	Parallel†	
Voltage, a-c or d-c	8.4	4.2	volts
Current	225	450	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode	200	200	volts
Heater positive to cathode★	200	200	volts
†Warm-up time	11 secs. average		

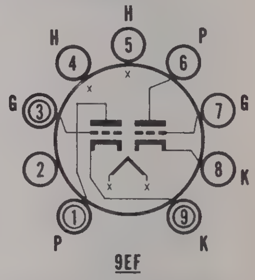
★D-c component must not exceed 100 volts max.

Type 8CN7 is identical to type 6CN7 except for heater characteristics. See type 6CN7 for ratings and operating characteristics.

8CS7

TV vertical deflection amplifier and oscillator, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

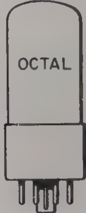


Voltage, a-c or d-c	8.4	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

★D-c component must not exceed 100 volts max.

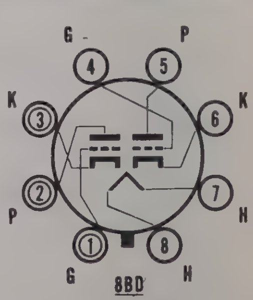
Type 8CS7 is identical to type 6CS7 except for heater characteristics.

8SN7GTB



TV sweep oscillator and vertical amplifier; phase inverter and R-C amplifier

HEATER CHARACTERISTICS

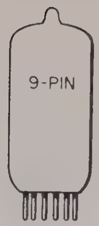


Voltage, a-c or d-c	8.4	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

★D-c component must not exceed 100 volts max.

Type 8SN7GTB is identical to type 6SN7GTB except for heater characteristics. See type 6SN7GTB for ratings and operating characteristics.

9AU7

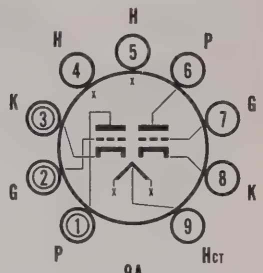


TV sweep oscillator and vertical amplifier or phase inverter

HEATER CHARACTERISTICS

	Series	Parallel†	
Voltage, a-c or d-c	9.4	4.7	volts
Current	225	450	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode		200	volts
Heater positive to cathode★		200	volts
†Warm-up time		11 secs. average	

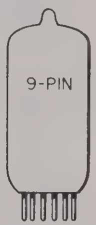
★D-c component must not exceed 100 volts max.



9A

Type 9AU7 is identical to types 7AU7, 12AU7 and 12AU7A except for heater characteristics. See type 7AU7 for ratings and characteristics.

9CL8

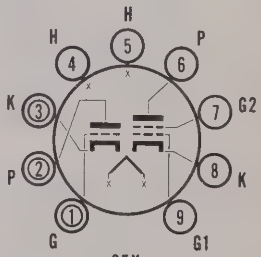


Vhf oscillator and mixer, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	9.5	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

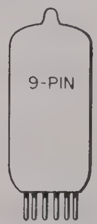
★D-c component must not exceed 100 volts max.



9FX

Type 9CL8 is identical to types 5CL8 and 6CL8 except for heater characteristics. See type 5CL8 for ratings and operating characteristics.

9U8A

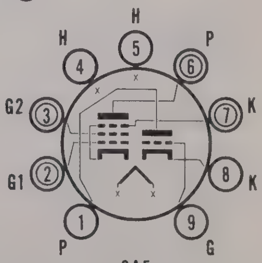


Vhf oscillator and mixer, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	9.45	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

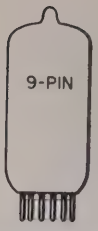
★D-c component must not exceed 100 volts max.



9AE

Type 9U8A is identical to types 5U8 and 6U8 except for heater characteristics. See type 5U8 for ratings and operating characteristics.

CBS 9X8



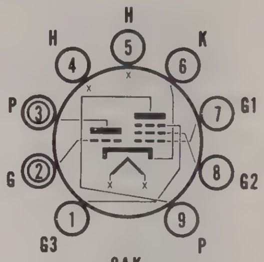
Vhf oscillator and mixer, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	9.5	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



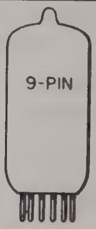
9AK

Type 9X8 is identical to types 5X8 and 6X8 except for heater characteristics. Similar, but not identical types, are the 5AT8, 6AT8, 5CG8 and 6CG8. See type 5X8 for ratings and operating characteristics.

10

(See chart for seldom-used tubes)

CBS 10C8



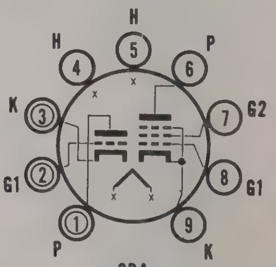
Vertical oscillator, voltage amplifier or sync triode and a general purpose pentode amplifier, warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	10.5	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



9DA

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

Grid to plate: g1 to p	1.6	μμf
Input: g1 to k + h	2.4	μμf
Output: p to k + h	0.2	μμf

Pentode Section

Grid to plate: g1 to p	0.04	μμf
Input: g1 to k + h + g2 + g3	7.0	μμf
Output: p to k + h + g2 + g3	2.0	μμf
Coupling: pentode grid 1 to triode plate, max.	0.008	μμf
Coupling: pentode plate to triode grid, max.	0.006	μμf
Coupling: pentode plate to triode plate, max.	0.06	μμf

10C8 (cont.)

MAXIMUM RATINGS (Design maximum values)

Class A Amplifier	**Triode**	**Pentode**	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.0	2.2	watts
Grid 2 dissipation		0.55	watts
Grid 1 circuit resistance			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

Vertical Oscillator and Amplifier†	**Amplifier▲**	**Oscillator▼**	
Plate voltage, d-c	300	300	volts
Plate voltage, peak positive pulse	1000		volts
Grid 1 voltage, peak negative	250	400	volts
Plate dissipation	2.5*	1.0	watts
Cathode current, d-c	18	12	ma
Cathode current, peak	55	35	ma
Grid 1 circuit resistance			
Fixed bias		2.2	meg
Cathode bias	2.2	2.2	meg
Grid-leak bias	2.2	2.2	meg

CHARACTERISTICS AND TYPICAL OPERATION

	Pentode▲	**Pentode**	**Triode**	
Plate voltage	135	135	250	volts
Grid 2 (screen) voltage		135		volts
Grid 1 (control-grid) voltage	0♦			volts
Cathode-bias resistor		100	390	ohms
Plate resistance (approx.)		190,000	12,000	ohms
Transconductance		8000	4400	µmhos
Amplification factor	40		53	
Plate current	33	11.5	7.3	ma
Grid 2 current		3.2		ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$			—10	volts
Grid 1 voltage (approx.) for $I_b = 50\ \mu a$		—6		volts

NOTES:

†Voltage pulse duration must not exceed 2500 µs in 525-line, 30-frame system.

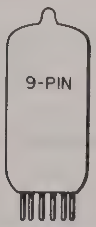
*Tube protection is needed for no-drive conditions if grid-resistor bias is used.

♦So as not to damage tube, apply for a maximum of 2 seconds.

▲Pentode section triode connected.

▼Triode section.

CBS 10DA7

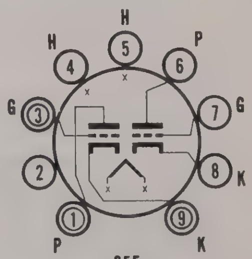


Combined vertical amplifier and oscillator for TV receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	10.5	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

★D-c component must not exceed 100 volts max.



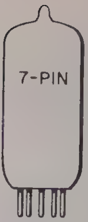
9EF

Type 10DA7 is identical to type 6DA7 except for heater characteristics. See type 6DA7 for ratings and operating characteristics.

11

(See chart for seldom-used tubes)

11C5

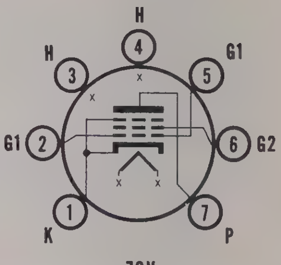


Beam power amplifier for a-c/d-c television receivers, heater warm-up time controlled for series string operation

HEATER CHARACTERISTICS

Voltage, a-c or d-c	11.6	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	180	volts
Heater positive to cathode	180	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).



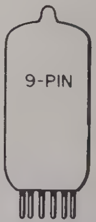
7CV

Type 11C5 is identical to type 35C5 except for heater characteristics. See type 35C5 for ratings and operating characteristics.

12 • 12A/112A • 12A4 • 12A5
12A6/GT • 12A7 • 12A8/GT

(See chart for seldom-used tubes)

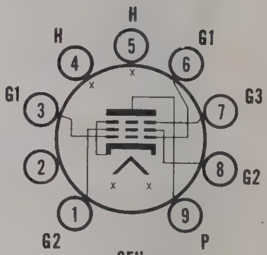
12AB5



Audio power amplifier for automobile radios powered by a 12-volt battery

HEATER CHARACTERISTICS

Voltage, a-c or d-c*	12.6	volts
Current	200	ma
Heater-cathode voltage, max.		
Heater negative to cathode, d-c	200	volts
Heater positive to cathode, d-c	100	volts



9EU

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.7	μμf
Input: g1 to k + h + g2 + b.p.	8.0	μμf
Output: p to k + h + g2 + b.p.	8.5	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	315	volts
Grid 2 voltage	285	volts
Plate dissipation	12	watts
Grid 2 dissipation	2	watts
Grid circuit resistance		
Fixed bias	0.1	meg
Cathode bias	0.5	meg
Bulb temperature at hottest point	250	°C

12AB5 (cont.)

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier (Single Tube)

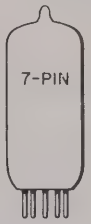
Plate voltage	250	250	volts
Grid 2 (screen) voltage	200	250	volts
Grid 1 (control-grid) voltage		—12.5	volts
Cathode bias resistor	270		ohms
Plate resistance (approx.)	0	50,000	ohms
Transconductance	4000	4100	μmhos
Grid 1 input voltage, peak a-f	10.5	12.5	volts
Plate current, zero signal	33.5	45.0	ma
Plate current, maximum signal	36.0	47	ma
Grid 2 current, zero signal	1.6	4.5	ma
Grid 2 current, maximum signal	3.2	7.0	ma
Load resistance impedance	6000	5000	ohms
Power output, maximum signal	3.3	4.5	watts

NOTE:

*Heater is designed to be powered from a 12-volt battery in automotive service, and will operate over a range of 10.0 to 15.9 volts encountered in this service. Maximum ratings provide for an adequate safety factor to withstand the wide variation in supply voltages.

CBS

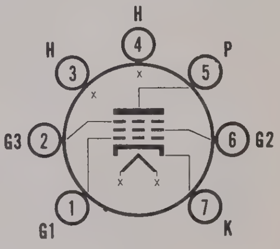
12AC6



I-f or r-f amplifier for 12-volt A and B supply automobile radios

HEATER CHARACTERISTICS*

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts



7BK

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p, max.	0.005	0.004	μμf
Input: g1 to k + h + g2 + g3	4.3	4.3	μμf
Output: p to k + h + g2 + g3	5.0	5.0	μμf

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	30	volts
Grid 2 voltage	30	volts
Cathode current	20	ma
Grid 1 circuit resistance	10	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	12.6	volts
Grid 3 (suppressor)	connected to cathode at socket	
Grid 2 (screen) voltage†	12.6	volts
Grid 1 (control-grid) voltage†	0	volts
Plate resistance (approx.)	0.5	meg
Transconductance‡	730	μmhos
Plate current	550	μa
Grid 2 current	28	μa
Grid 3 voltage (approx.) for g_m‡ = 10 μmhos, E_{c1} = 0V†	—4.7	volts
Grid 1 voltage (approx.) for g_m‡ = 10 μmhos, E_{c3} = 0V	—7.2	volts

NOTES:

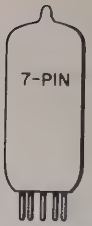
*Type 12AC6 is intended for use in automobile receivers operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10 volts to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variation encountered in this type of supply.

†R_{c1} = 2.2 meg.

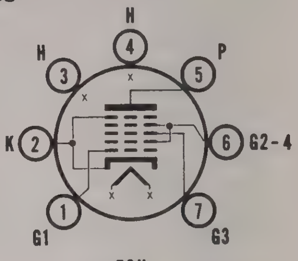
‡From grid 1 to plate.

CBS

12AD6



Combined oscillator-mixer for 12-volt A and B supply automobile radios



7CH

HEATER CHARACTERISTICS*

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Signal grid to mixer plate: g3 to p, max.	0.30	0.25	μμf
R-f input: g3 to all others	8.0	8.0	μμf
Mixer output: p to all others	8.0	13.0	μμf
Oscillator input: g1 to all others	5.5	5.5	μμf
Oscillator output: k to h + g2 & 4 + g3 + p	15	20	μμf
Oscillator grid to cathode: g1 to k + g5	3.0	3.0	μμf
Oscillator grid to mixer plate: g1 to p, max.	0.1	0.05	μμf
Oscillator grid to signal grid: g1 to g3, max.	0.15	0.15	μμf

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	30	volts
Grid 2 and 4 voltage	30	volts
Grid 2 and 4 supply voltage	30	volts
Grid 3 voltage, negative d-c	—30	volts
Grid 3 voltage, positive d-c	0	volts
Cathode current	20	ma
Grid 3 circuit resistance	10	meg

CHARACTERISTICS AND TYPICAL OPERATION

Converter Service (Self excitation)

Plate voltage	12.6	volts
Grid 3 (signal grid) voltage	0	volts
Grid 2 and 4 (oscillator anode) voltage	12.6	volts
Grid 1 (oscillator grid) resistance	33,000	ohms
Grid 3 resistance	2.2	meg
Grid 1 (oscillator grid) voltage, rms	1.6	volts
Plate resistance (approx.)	1.0	meg
Conversion transconductance	260	μmhos
Cathode current	2000	μa
Plate current	450	μa
Grid 2 and 4 (oscillator anode) current	1500	μa
Grid 1 (oscillator grid) current	50	μa
Grid 3 voltage (approx.) for g_c = 5 μmhos	—2.2	volts
Grid 3 voltage (approx.) for g_c = 20 μmhos	—1.8	volts

Oscillator Characteristics, Not Oscillating

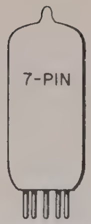
Plate voltage	12.6	volts
Grid 3 voltage	0	volts
Grid 2 and 4 (connected to plate) voltage	12.6	volts
Grid 1 (oscillator grid) voltage	0	volts
Transconductance between grid 1, and grids 2 & 4 connected to plate	3800	μmhos
Amplification factor between grid 1, and grid 2 & 4 connected to plate	9.0	
Cathode current	5.0	ma
Grid 1 voltage (approx.) for I_b = 10 μa	—4.0	volts

NOTE:

*Type 12AD6 is intended for use in automobile radios operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10 volts to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variation encountered in this type of supply.

CBS

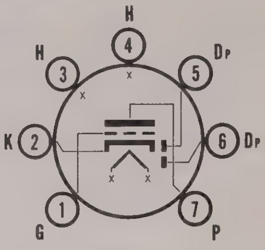
12AE6



Combined detector—a-f voltage amplifier for 12-volt A and B supply automobile radios

HEATER CHARACTERISTICS*

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts



7BT

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	2.0	μμf
Input: g1 to k + h	1.8	μμf
Output: p to k + h	1.1	μμf
Diode 1 to diode 2	0.9	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	30	volts
Cathode current	20	ma
Control-grid circuit resistance	10	meg
Diode current, average	1.0	ma

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier—Triode Unit

Plate voltage	12.6	volts
Control-grid voltage	0	volts
Plate resistance (approx.)	15,000	ohms
Transconductance	1000	μmhos
Amplification factor	15	
Plate current	750	μa

Diode Units

Average diode current with 10 volts applied, each diode	2.0	ma

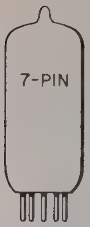
Resistance Coupled Amplifier

Plate supply voltage	14.4	volts
Control-grid voltage	0	volts
Plate load resistor	.47	meg
Control-grid resistor	2.2	meg
Input capacitor	.01	μf
Output capacitor	.01	μf
Grid resistor of following stage	2.2	meg
Signal source impedance, max.	1000	ohms
Voltage gain at 400 cps (measured at an output voltage of 1 volt, rms)	10	

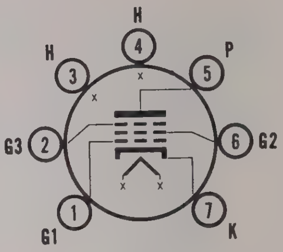
NOTE:

*Type 12AE6 is intended for use in automobile receivers operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10 volts to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variations encountered in this type of supply.

12AF6



R-f or i-f amplifier for 12-volt A and B supply automobile radios



7BK

HEATER CHARACTERISTICS

Voltage, a-c or d-c*	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	16	volts
Heater positive to cathode	16	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	0.006	$\mu\mu$f
Input: g1 to k + h + g2 + g3	5.5	$\mu\mu$f
Output: p to k + h + g2 + g3	4.8	$\mu\mu$f

MAXIMUM RATINGS (Design center values)

Plate voltage	16	volts
Grid 2 voltage	16	volts
Grid voltage, positive d-c	0	volts
Grid 1 circuit resistance	2.2	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	12.6	volts
Grid 3 (suppressor)	connected to cathode at socket	
Grid 2 (screen) voltage	12.6	volts
Grid 1 (control-grid) supply voltage	0	volts
Grid 1 resistor (by passed)	2.2	meg
Plate resistance (approx.)	0.3	meg
Transconductance	1250	μmhos
Plate current	.8	ma
Grid 2 current	.3	ma
Grid 1 voltage (approx.) for $g_m = 40\ \mu$mhos	—2.7	volts

NOTE:

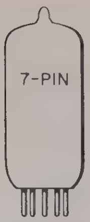
*Type 12AF6 is intended for use in automobile radios operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10 volts to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variation encountered in this type of supply.

12AH6 • 12AH7GT

(See chart for seldom-used tubes)

CBS

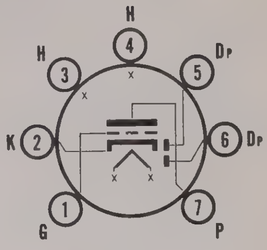
12AJ6



Combined detector—a-f voltage amplifier for 12-volt A and B supply automobile radios

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts



7BT

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	2.0	μμf
Input: g1 to k + h	2.2	μμf
Output: p to k + h	0.8	μμf
Diode 1 to diode 2	0.9	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	30	volts
Cathode current	20	ma
Control-grid circuit resistance	10	meg
Diode current, average	1.0	ma

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	12.6	volts
Control-grid voltage	0	volts
Plate resistance (approx.)	45,000	ohms
Transconductance	1200	μmhos
Amplification factor	55	
Plate current	750	μa

Diode Units

Average diode current with 10 volts applied, each diode	2.0	ma

Resistance Coupled Amplifier

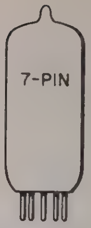
Plate supply voltage	12.6	volts
Control-grid voltage	0	volts
Plate load resistor	1.0	meg
Control-grid resistor	1.0	meg
Input capacitor	0.02	μf
Output capacitor	0.01	μf
Grid resistor of following stage	2.0	meg
Voltage gain at 400 cps (measured at an output voltage of 1 volt, rms)	16	

NOTES:

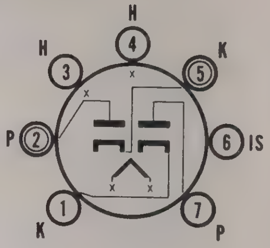
*Type 12AJ6 is intended for use in automobile receivers operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10 volts to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variations encountered in this type of supply.

CBS

12AL5



R-f detector in f-m and television circuits or low power rectifier



6BT

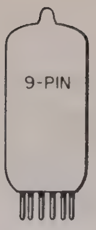
HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	330	volts
Heater positive to cathode	330	volts

Type 12AL5 is identical to types 3AL5 and 6AL5 except for heater characteristics. See type 3AL5 for ratings and characteristics.

CBS

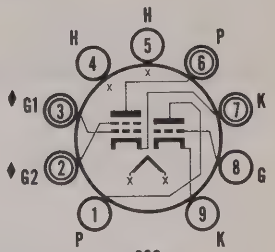
12AL8



Combined detector or voltage amplifier and space charge grid power amplifier for 12-volt A and B supply automobile radio receivers

HEATER CHARACTERISTICS*

Voltage, a-c or d-c	12.6	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts



9GS

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

Grid to plate: g1 to p	12	μμf
Input: g1 to k + h	1.5	μμf
Output: p to k + h	0.3	μμf

Tetrode Section

Grid to plate: g1 to p	0.7	μμf
Input: g2 to k + h + g1	8.0	μμf
Output: p to k + h + g1	1.1	μμf
Coupling: tetrode grid 2 to triode grid 1	.013	μμf

MAXIMUM RATINGS (Design center values)

	Tetrode	Triode	
Plate voltage	30	30	volts
Grid 1 voltage, positive d-c	16		volts
Grid 2 voltage, negative d-c	20		volts
Grid 2 circuit resistance	2.2		meg
Cathode current		20	ma
Grid 1 circuit resistance		10	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier (Single Tube)

	Triode	Tetrode	
Plate voltage	12.6	12.6	volts
Grid 1 (space-charge grid) voltage		12.6	volts
Grid 1 triode (control-grid) voltage	−0.9†		
Grid 2 tetrode (control-grid) voltage		−0.8†▲	volts
Plate resistance	27,000	1000	ohms
Amplification factor	15	3.0🌢	
Transconductance	550	8000🌢	μmhos
Plate current	0.25	25	ma
Grid 1 (space-charge grid) current		50	ma

Resistance-Coupled Amplifier (Single Tube)

Plate (space-charge grid and heater) supply voltage	12.6	volts
A-f signal voltage	.13	volts
Plate current (tetrode)	13	ma
Grid 1 (space-charge grid) current	50	ma
Load resistance (tetrode)	800	ohms
Total harmonic distortion	8	%
Power output	20	mw

NOTES:

*Type 12AL8 is intended for use in automobile receivers operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10 volts to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variations encountered in this type of supply.

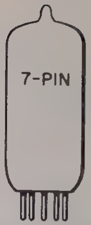
†Average contact potential developed across a 2.2 megohm grid resistor.

▲Grid 2.

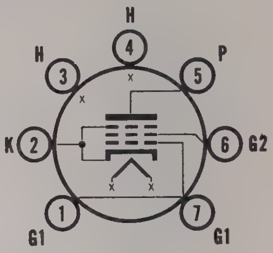
🌢From grid 2 to plate.

♦Grid 1 space-charge grid. Grid 2 control-grid.

12AQ5



General-purpose power amplifier for a-c operated and 12-volt automobile receivers



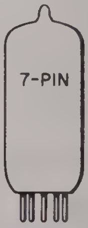
7BZ

HEATER CHARACTERISTICS

Voltage, a-c or d-c..........	12.6	volts
Current....................	225	ma

Type 12AQ5 is identical to types 5AQ5 and 6AQ5 except for heater characteristics. See type 5AQ5 for ratings and characteristics.

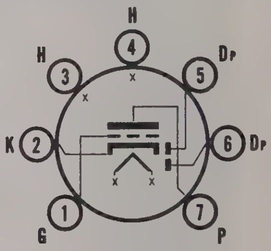
12AT6



Combined detector, audio amplifier, and automatic-volume-control tube

HEATER CHARACTERISTICS

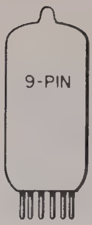
Voltage, a-c or d-c..........	12.6	volts
Current....................	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode..................	90	volts
Heater positive to cathode..................	90	volts



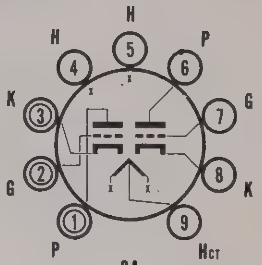
7BT

Type 12AT6 is identical to type 6AT6 except for heater ratings.

CBS 12AT7



Frequency converter or cathode-driven amplifier in the vhf bands



9A

HEATER CHARACTERISTICS

Voltage,	Series	Parallel	
a-c or d-c	12.6	6.3	volts
Current	150	300	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode	90	90	volts
Heater positive to cathode	90	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1		Section 2	
Grid to plate: g1 to p	1.5		1.5	μμf
Input: g1 to k + h	2.2		2.2	μμf
Output: p to k + h	0.5		0.4	μμf
Grid (Sect. 1) to grid (Sect. 2)		.005		μμf
Plate (Sect. 1) to plate (Sect. 2)		0.4		μμf
Heater to cathode	2.4		2.4	μμf
Grounded-grid operation				
Plate to cathode	0.2		0.2	μμf
Input	4.6		4.6	μμf
Output	1.8		1.8	μμf

MAXIMUM RATINGS (Design center values)▲

Plate voltage	300	volts
Plate dissipation	2.5	watts

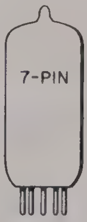
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier▲

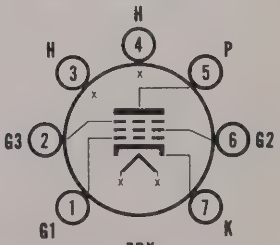
Plate voltage	100	180	250	volts
Control-grid voltage	−1.0	−1.0	−2.0	volts
Cathode-bias resistor	270	90	200	ohms
Plate resistance (approx.)	15,000	9400	10,900	ohms
Transconductance	4000	6000	5500	μmhos
Amplification factor	60	62	60	
Plate current	3.7	11.0	10.0	ma
Control-grid voltage (approx.) for $I_b = 10\ \mu a$	−5	−8	−12	volts

▲Each section.

CBS 12AU6



R-f or i-f amplifier used in a-c/d-c radio service



7BK

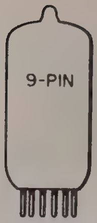
HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	180	volts
Heater positive to cathode	100	volts

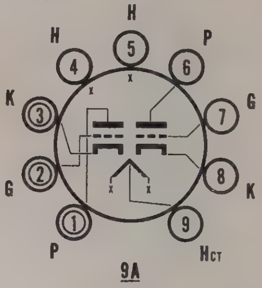
Type 12AU6 is identical to types 3AU6 and 6AU6 except for heater characteristics. See type 3AU6 for ratings and characteristics.

12AU7

12AU7A



TV sweep oscillator and vertical amplifier or phase inverter



HEATER CHARACTERISTICS

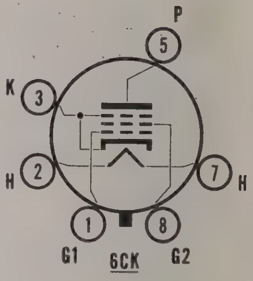
	Series	Parallel	
Voltage, a-c or d-c	12.6	6.3	volts
Current	150	300	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode		200	volts
Heater positive to cathode★		200	volts

★D-c component 100 volts max.

Types 12AU7 and 12AU7A are identical electrically to type 7AU7 except for heater characteristics. The 12AU7A has improved mechanical rigidity and is less subject to microphonics.

12AV5GA

Horizontal deflection amplifier for television receiver sweep circuits



HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

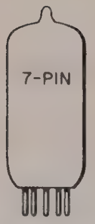
(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.

Type 12AV5GA is identical to types 6AV5GA and 25AV5GA except for heater characteristics. See 6AV5GA for ratings and characteristics.

CBS

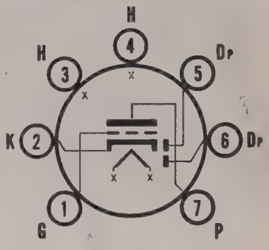
12AV6



Detector, avc, and audio amplifier for ac/dc or 12-volt automobile receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

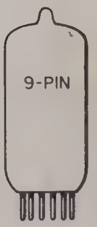


7BT

Type 12AV6 is identical to types 3AV6 and 6AV6 except for heater characteristics. See type 3AV6 for ratings and characteristics.

CBS

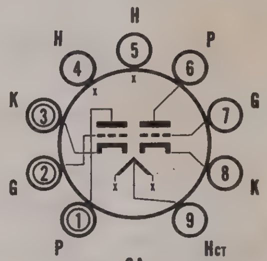
12AV7



Radio frequency converter or audio frequency amplifier

HEATER CHARACTERISTICS

	Series	Parallel	
Voltage, a-c or d-c	12.6	6.3	volts
Current	225	450	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode	90	90	volts
Heater positive to cathode	90	90	volts



9A

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1		Section 2		
	No Shield	Shield♦	No Shield	Shield♦	
Grid to plate: g1 to p	1.9	1.9	1.9	1.9	μμf
Input: g1 to k + h	3.1	3.2	3.1	3.2	μμf
Output: p to k + h	0.5	1.3	0.4	1.6	μμf
Plate to cathode: p to k	0.24	0.24	0.24	0.23	μμf
Plate to grid and heater: p to g1 + h	2.0		2.0		μμf
Cathode to grid and heater: k to g + h	6.9		6.9		μμf
Cathode to heater: k to h	3.8	4.0	3.8	4.0	μμf
Plate to grid, heater, and external shield: p to g1 + h + e.s.		2.8		3.2	μμf
Cathode to grid, heater, and external shield: k to g1 + h + e.s.		7.0		7.0	μμf

♦JETEC shield 315 connected to cathode.

12AV7 (cont.,

MAXIMUM RATINGS (Design center values)▲

Plate voltage	300	volts
Control-grid voltage, negative d-c	−50	volts
Plate dissipation	2.7	watts

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier▲

Plate supply voltage	100	150	volts
Cathode-bias resistor	120	56	ohms
Plate resistance (approx.)	6100	4800	ohms
Transconductance	6100	8500	μmhos
Amplification factor	37	41	
Plate current	9	18	ma
Control-grid voltage (approx.) for $I_b = 10\ \mu a$	−9	−12	volts

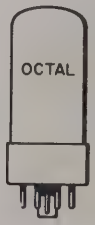
▲Each section.

12AW6

(See chart for seldom-used tubes)

12AX4GT

12AX4GTA



Damper diode for television horizontal sweep circuits

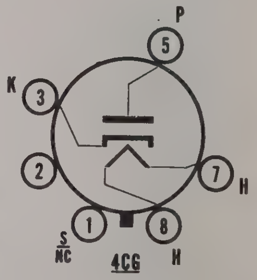
HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	0.6	amp
Peak heater-cathode voltage, max.*		
Heater negative to cathode†♦	4400	volts
Heater positive to cathode★	300	volts

†Absolute maximum value.

♦D-c component must not exceed 900 volts max.

★D-c component must not exceed 100 volts max.



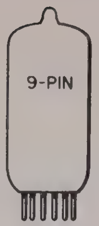
12AX4GTA

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

Types 12AX4GT and 12AX4GTA are identical to types 6AX4GT and 25AX4GT except for heater characteristics. See type 6AX4GT for ratings and characteristics.

*Voltage pulse duration must not exceed 10μs in a 525-line, 30 frame system.

12AX7

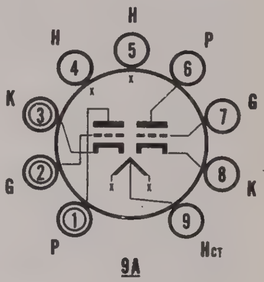


Phase inverter or resistance-coupled audio amplifier

HEATER CHARACTERISTICS

Voltage,	Series	Parallel	
a-c or d-c.....	12.6	6.3	volts
Current.........	150	300	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode...	200	200	volts
Heater positive to cathode★	200	200	volts

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1	Section 2	
Grid to plate: g1 to p........................	1.7	1.7	μμf
Input: g1 to k + h..........................	1.6	1.6	μμf
Output: p to k + h..........................	0.46	0.34	μμf

MAXIMUM RATINGS (Design center values)▲

Plate voltage..	300	volts
Control-grid voltage, negative d-c..........................	50	volts
Control-grid voltage, positive d-c..........................	0	volts
Plate dissipation...	1.0	watt

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier▲

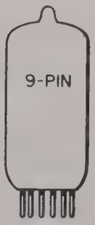
Plate voltage..................................	100	250	volts
Control-grid voltage..........................	—1	—2	volts
Plate resistance (approx.)....................	.08	.0625	meg
Transconductance..............................	1250	1600	μmhos
Amplification factor..........................	100	100	
Plate current..................................	0.5	1.2	ma

▲Each section.

12AY7

(See chart for seldom-used tubes)

12AZ7

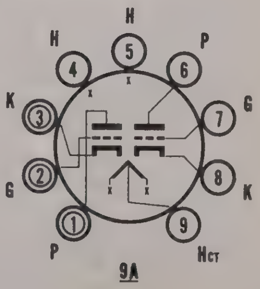


Frequency converter or cathode driven amplifier in the vhf bands

HEATER CHARACTERISTICS

Voltage,	Series	Parallel	
a-c or d-c.....	12.6	6.3	volts
Current.........	225	450	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode...	200	200	volts
Heater positive to cathode★.	200	200	volts

★D-c component must not exceed 100 volts max.



12AZ7 (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1		Section 2		
Grid Drive	**No Shield**	**Shield♦**	**No Shield**	**Shield♦**	
Grid to plate: g1 to p	1.9	1.9	1.9	1.9	μμf
Input: g1 to k + h	3.1	3.2	3.1	3.2	μμf
Output: p to k + h	0.5	1.3	0.4	1.6	μμf
Heater to cathode	3.8	4.0	3.8	4.0	μμf
Cathode Drive					
Plate to cathode: p to k	0.24	0.23	0.24	0.23	μμf
Cathode to grid and heater: k to g1 + h	6.9	7.0	6.9	7.0	μμf
Plate to grid and heater: p to g1 + h	2.0	2.8	2.0	3.2	μμf

♦JETEC shield 315 connected to cathode.

MAXIMUM RATINGS (Design center values)▲

Plate voltage	300	volts
Control-grid voltage, negative d-c	50	volts
Plate dissipation	2.5	watts
Control-grid circuit resistance		
Fixed bias	0.25	meg
Self bias	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier▲

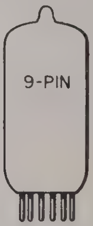
Plate supply voltage	100	250	volts
Cathode-bias resistor	270	200	ohms
Plate resistance (approx.)	15,000	10,900	ohms
Transconductance	4000	5500	μmhos
Amplification factor	60	60	
Plate current	3.7	10	ma
Control-grid voltage (approx.) for $I_b = 10$ μa	−5	−12	volts

▲Each section.

CBS

12B4

12B4A

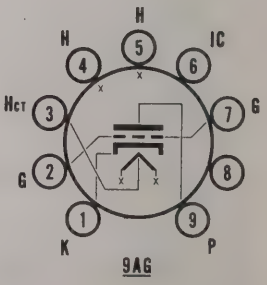


Vertical deflection output amplifier for television receivers

HEATER CHARACTERISTICS

	Series	Parallel	
Voltage, a-c or d-c	12.6	6.3	volts
Current	300	600	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode		200	volts
Heater positive to cathode★		200	volts

★D-c component 100 volts max.



12B4A

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield♦

Grid to plate: g1 to p	4.0	μμf
Input: g1 to k + h	6.2	μμf
Output: p to k + h	4.2	μμf

♦JETEC shield 315 connected to cathode.

12B4 • 12B4A (cont.)

MAXIMUM RATINGS (Design center values unless noted)	Vertical Deflection Amplifier▲	Class A Amplifier	
Plate voltage, d-c	550	550	volts
Plate voltage, peak pos. (absolute max.)	1000		volts
Control-grid voltage, peak negative	250		volts
Plate dissipation■	5.5	5.5	watts
Cathode current, average	30		ma
Cathode current, peak	105		ma
Control-grid circuit resistance			
Fixed bias		0.47	meg
Self bias	2.2	2.2	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	150	volts
Control-grid voltage	—17.5	volts
Plate resistance (approx.)	1030	ohms
Transconductance	6300	μmhos
Amplification factor	6.5	
Plate current	34	ma
Plate current for E_{c1} = —23 volts	9.6	ma
Grid 1 voltage (approx.) for I_b = 200 μa	—32	volts

NOTES:

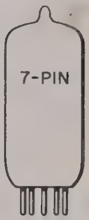
▲Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

■Tube protection is needed for no-drive conditions if grid-resistor bias is used.

12B7 • 12B8GT

(See chart for seldom-used tubes)

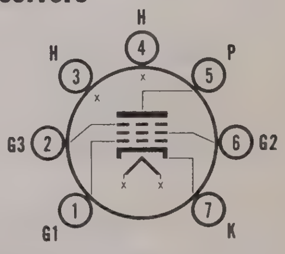
CBS 12BA6



R-f or i-f amplifier in a-c/d-c receivers or 12-volt automobile receivers

HEATER CHARACTERISTICS

Voltage, a-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



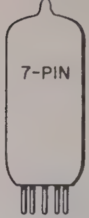
7BK

Type 12BA6 is identical to types 3BA6 and 6BA6 except for heater characteristics. See type 3BA6 for complete ratings and characteristics.

12BA7

(See chart for seldom-used tubes)

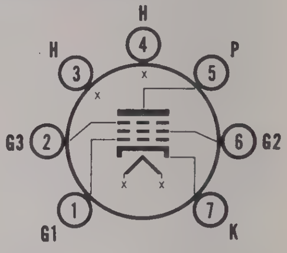
CBS 12BD6



Gain-controlled r-f or i-f amplifier for a-c/d-c or 12-volt automobile radio equipment

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



7BK

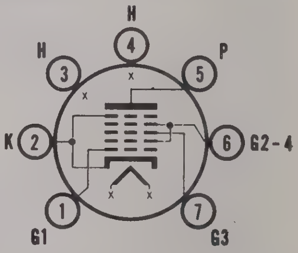
Type 12BD6 is identical to type 6BD6 except for heater characteristics.

CBS 12BE6

Radio frequency converter in a-c/d-c receivers or 12-volt automobile radios

HEATER CHARACTERISTICS

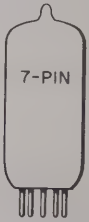
Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



7CH

Type 12BE6 is identical to types 3BE6 and 6BE6 except for heater characteristics. See type 3BE6 for ratings and characteristics.

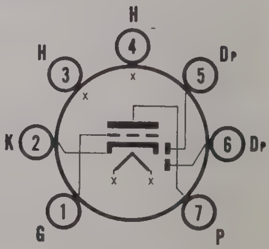
CBS 12BF6



Detector, avc, and audio tube for 12-volt automobile radio receivers

HEATER CHARACTERISTICS

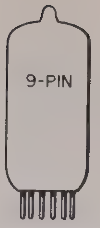
Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts



7BT

Type 12BF6 is identical to type 6BF6 except for heater characteristics.

12BH7



12BH7A

Combined sweep oscillator and vertical output amplifier

HEATER CHARACTERISTICS

Voltage,	Series	Parallel	
a-c or d-c	12.6	6.3	volts
Current	300	600	ma

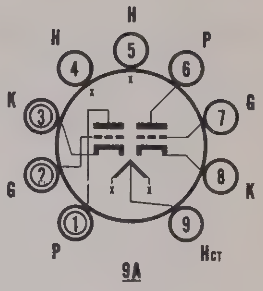
Peak heater-cathode voltage, max.

Heater neg. to cathode	200	volts
Heater pos. to cathode★	200	volts

★D-c component must not exceed 100 volts max.

12BH7A

Warm-up time...... 11 secs. average



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1		Section 2		
Grid to plate:	Shield♦	No Shield	Shield♦	No Shield	
g1 to p	2.4	2.4	2.4	2.4	μμf
Input: g1 to k + h.	3.3	3.3	3.3	3.3	μμf
Output: p to k + h.	2.0	0.8	2.0	0.8	μμf
Coupling: plate to plate (shield)		0.6♦			μμf
Coupling: plate to plate (no shield)		0.9			μμf

♦JETEC shield 315 connected to cathode.

MAXIMUM RATINGS **(Design center values unless noted)**	**Vertical Deflection Amplifier†**	**Class A Amplifier**	
Plate voltage, d-c	500	300	volts
Plate voltage, peak pos. (absolute max.)	1485		volts
Plate voltage, peak negative	—50	—50	volts
Control-grid voltage, peak negative pulse (absolute max.)	220		volts
Plate dissipation (each plate)	3.85	3.5	watts
Plate dissipation (total for both plates)		6.0	watts
Cathode current, average (each section)	20	20	ma
Control-grid circuit resistance			
Fixed bias	1.0	1.0	meg
Self bias	2.5	2.5	meg

AVERAGE CHARACTERISTICS

Class A Amplifier

Plate voltage	250	volts
Control-grid voltage	—10.5	volts
Transconductance (each unit)	3100	μmhos
Amplification factor	17.0	
Plate current (each unit)	11.5	ma

12BH7A

Grid 1 voltage (approx.) for $I_b = 50$ μa and $E_b = 150$ volts	—17	volts

12BH7

Grid 1 voltage (approx.) for $I_b = 100$ μa and $E_b = 250$ volts	—22	volts

CHARACTERISTICS AND TYPICAL OPERATION

Vertical Deflection Amplifier†

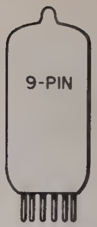
Plate voltage	350	volts
Control-grid input voltage		
Negative peak component	32	volts
Peak to peak	25	volts
Cathode-bias resistor	560	ohms
Plate current	16	ma
Plate output voltage		
Peak positive pulse component	670	volts
Peak to peak	230	volts
Sweep height (16RP4 or 16TP4 with 14kv on anode)	10½	inches

NOTES:

†Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

CBS

12BK5



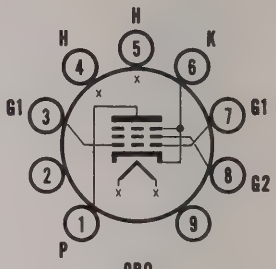
Audio power amplifier suitable for small driving voltages, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component 100 volts max.

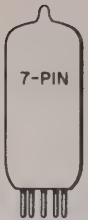


9BQ

Type 12BK5 is identical to types 6BK5, 25BK5, and 50BK5 except for heater ratings. See type 6BK5 for ratings and characteristics.

CBS

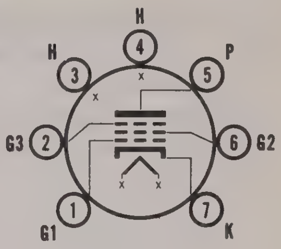
12BL6



I-f or r-f amplifier for 12-volt A and B supply automobile radios

HEATER CHARACTERISTICS*

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts



78K

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Shield ♦

Grid to plate: g1 to p, max.	.006	μμf
Input: g1 to k + h + g2 + g3	5.5	μμf
Output: p to k + h + g2 + g3	4.8	μμf

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	30	volts
Grid 2 voltage	30	volts
Cathode current	20	ma
Grid 1 circuit resistance	10	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	12.6	volts
Grid 3 (suppressor)	connected to cathode at socket	
Grid 2 (screen) voltage	12.6	volts
Grid 1 (control-grid) voltage†	−0.65	volts
Plate resistance (approx.)	0.5	meg
Transconductance▲	1350	μmhos
Plate current	1350	μa
Grid 2 current	500	μa
Grid 1 & 3 voltage (approx.) for g_m▲ = 10 μmhos	−5.0	volts
Grid 1 voltage (approx.) for g_m▲ = 10 μmhos	−6.0	volts

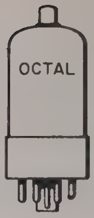
NOTES:

*Type 12BL6 is intended for use in automobile receivers operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10 volts to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variation encountered in this type of supply.

†Average contact potential developed across a 2.2 megohm grid resistor.

▲From grid 1 to plate.

12BQ6GT



12BQ6GA • 12BQ6GTA
12BQ6GTB

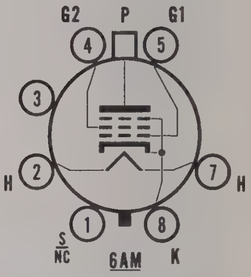
Horizontal deflection amplifier for television receivers, 600-ma series string types

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average†	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.

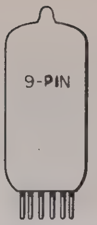


Types 12BQ6GA, 12BQ6GT, 12BQ6GTA and 12BQ6GTB are identical to their 6-volt prototypes, respectively, except for heater characteristics.

†Refers to all types except 12BQ6GT.

CBS

12BR7

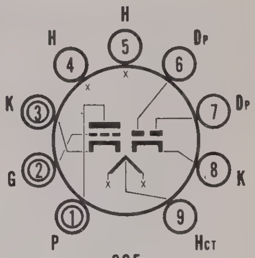


Combined horizontal phase detector and sync separator

HEATER CHARACTERISTICS

	Series	Parallel	
Voltage, a-c or d-c	12.6	6.3	volts
Current	225	450	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode	200	200	volts
Heater positive to cathode★	200	200	volts

★D-c component must not exceed 100 volts max.



9CF

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES — Shield♦

Triode Unit

Grid to plate: g1 to p	1.9	μμf
Input: g1 to k + h	2.8	μμf
Output: p to k + h	1.0	μμf

Diode Unit

Input (each diode)	2.0	μμf

♦JETEC shield 315 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Control-grid voltage, negative d-c	−50	volts
Plate dissipation	2.5	watts
Diode peak inverse voltage	300	volts
Diode peak current	60	ma

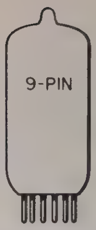
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	100	250	volts
Cathode-bias resistor	270	200	ohms
Plate resistance (approx.)	15,000	10,900	ohms
Transconductance	4000	5500	μmhos
Amplification factor	60	60	
Plate current	3.7	10	ma
Control-grid voltage (approx.) for $I_b = 10$ μa	−5	−12	volts
Average diode current with 5 volts d-c applied to each section		17	ma

CBS

12BV7

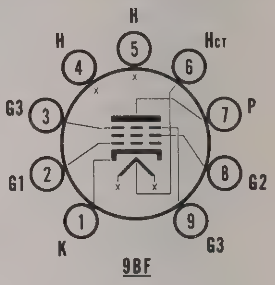


High-output video amplifier for television receivers with low plate-supply voltage

HEATER CHARACTERISTICS

	Series	Parallel	
Voltage, a-c or d-c	12.6	6.3	volts
Current	300	600	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode	200	200	volts
Heater positive to cathode★	200	200	volts

★D-c component 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	0.055	μμf
Input: g1 to k + h + g2 + g3	11.0	μμf
Output: p to k + h + g2 + g3	3.0	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	175	volts
Grid 1 voltage, negative d-c	50	volts
Plate dissipation	6.25	watts
Grid 2 dissipation	1.0	watt
Grid 1 circuit resistance		
Fixed bias	0.25	meg
Self bias	1.0	meg

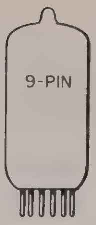
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

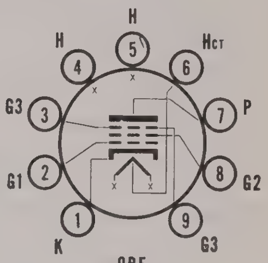
Plate voltage	250	volts
Grid 3 (suppressor)	connected to cathode at socket	
Grid 2 (screen) voltage	150	volts
Cathode bias resistor	68	ohms
Plate resistance (approx.)	85,000	ohms
Transconductance	13,000	μmhos
Plate current	27	ma
Grid 2 current	6.0	ma
Grid 1 voltage (approx.) for $I_b = 20\ \mu a$	−12	volts

12BY7

12BY7A



High transconductance video output amplifier for television receivers



9BF

HEATER CHARACTERISTICS

	Series	Parallel	
Voltage, a-c or d-c	12.6	6.3	volts
Current	300	600	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode		200	volts
Heater positive to cathode★		200	volts

12BY7A

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual.)

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	12BY7	12BY7A	
Grid to plate: g1 to p, max.	.063	.063	μμf
Input: g1 to k + h + g2 + g3 + i.s.	10.7	10.2	μμf
Output: p to k + h + g2 + g3 + i.s.	4.0	3.5	μμf

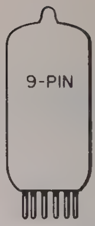
MAXIMUM RATINGS

(Design center values)	12BY7	12BY7A	
Plate voltage	300	300	volts
Grid 2 voltage	180	180	volts
Grid 1 voltage, negative d-c	−50	−50	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	6.0	6.5	watts
Grid 2 dissipation	1.1	1.1	watts
Grid 1 circuit resistance			
Fixed bias	0.25	0.25	meg
Self bias	1.0	1.0	meg

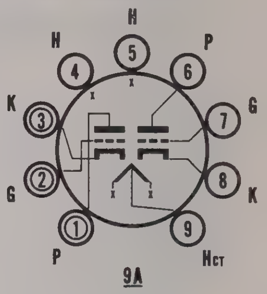
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	12BY7	12BY7A	
Plate voltage	250	250	volts
Grid 3 (suppressor)	connected to cathode at socket		
Grid 2 (screen) voltage	180	180	volts
Cathode bias resistor	100	100	ohms
Plate resistance (approx.)	90,000	93,000	ohms
Transconductance	12,000	11,000	μmhos
Plate current	24	26	ma
Grid 2 current	5.0	5.75	ma
Grid 1 voltage (approx.) for $I_b = 20\ \mu a$	−8	−11.6	volts
Amplification factor (g1 to g2)	31.5	28.5	

CBS 12BZ7



Sync separator and clipper for television receivers



HEATER CHARACTERISTICS

	Series	Parallel	
Voltage, a-c or d-c.....	12.6	6.3	volts
Current..........	300	600	ma
Peak heater-cathode voltage, max......	180	180	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1	Section 2	
Grid to plate: g1 to p........................	2.5	2.5	μμf
Input: g1 to k + h........................	6.5	6.5	μμf
Output: p to k + h........................	0.7	0.55	μμf
Plate (Sect. 1) to plate (Sect. 2).................	1.3		μμf

MAXIMUM RATINGS (Design center values)

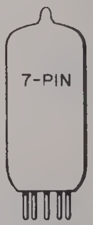
Plate voltage..	300	volts
Control-grid voltage, negative d-c........................	50	volts
Control-grid voltage, positive d-c........................	0	volts
Plate dissipation..	1.5	watts
Control-grid circuit resistance (for contact potential bias)........................	5.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

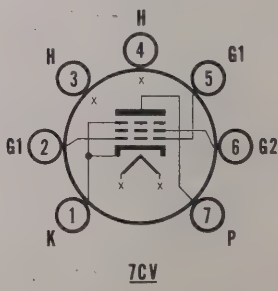
Class A Amplifier

Plate voltage..	250	volts
Control-grid voltage..	—2.0	volts
Plate resistance (approx.).................................	31,800	ohms
Transconductance..	3200	μmhos
Amplification factor..	100	
Plate current..	2.5	ma

CBS 12C5



Audio power output tube, heater warm-up controlled for series strings



HEATER CHARACTERISTICS

Voltage, a-c or d-c..........	12.6	volts
Current.....................	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode†...............	300	volts
Heater positive to cathode★...............	200	volts

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

†D-c component must not exceed 200 volts max.

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.55	µµf
Input: g1 to k + h + g2 + b.p.	13	µµf
Output: p to k + h + g2 + b.p.	9.0	µµf

MAXIMUM RATINGS (Design center values)

Plate voltage	135	volts
Grid 2 voltage	117	volts
Plate dissipation	5.5	watts
Grid 2 dissipation	1.25	watts
Grid 1 circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg
Bulb temperature at hottest point	250	°C

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

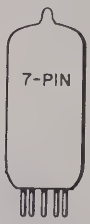
Plate voltage	110	volts
Grid 2 (screen) voltage	110	volts
Grid 1 (control-grid) voltage	−7.5	volts
Plate resistance (approx.)	10,000	ohms
Transconductance	7500	µmhos
Grid 1 input voltage, peak a-f	7.5	volts
Plate current, zero signal	49	ma
Plate current, maximum signal	50	ma
Grid 2 current, zero signal	4.0	ma
Grid 2 current, maximum signal	8.5	ma
Load resistance impedance	2500	ohms
Total harmonic distortion (approx.)	9	%
Power output, maximum signal	1.9	watts

12C8

(See chart for seldom-used tubes)

CBS

12CA5



A-f power amplifier with high output from a low B supply voltage, heater warm-up controlled for series strings

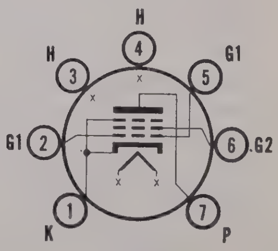
HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode★	300	volts
Heater positive to cathode♦	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 200 volts max.

♦D-c component must not exceed 100 volts max.

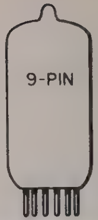


7CV

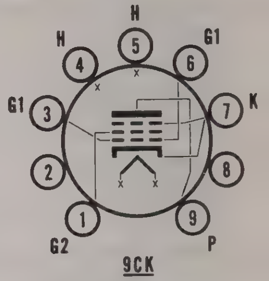
Type 12CA5 is identical to type 6CA5 except for heater characteristics and a maximum grid 1 circuit resistance (fixed bias) rating of 0.1 megohm.

CBS

12CM6



Audio power amplifier for 12-volt automobile radio receivers



HEATER CHARACTERISTICS

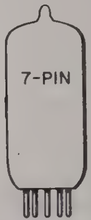
Voltage, a-c or d-c	12.6	volts
Current	225	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.

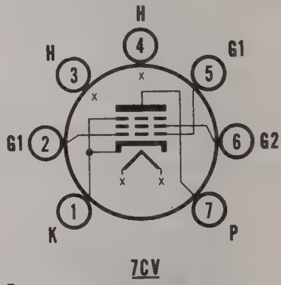
Type 12CM6 is identical to type 6CM6 except for heater characteristics.

CBS

12CN5



Pentode voltage amplifier for rf-if service in 12-volt A and B supply automobile radios



HEATER CHARACTERISTICS*

Voltage, a-c or d-c	12.6	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	16	volts
Heater positive to cathode	16	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	No Shield	Shield♦	
Grid to plate: g1 to p, max.	0.25	0.20	μμf

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design center values)

Plate voltage	16	volts
Grid 2 voltage	16	volts
Grid 1 voltage, positive d-c	0	volts
Grid 1 circuit resistance	2.2	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

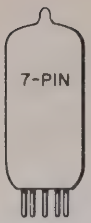
Plate voltage	12.6	volts
Grid 3 (suppressor)	connect to cathode at socket	
Grid 2 (screen) voltage	12.6	volts
Grid 1 (control-grid) voltage	0	volts
Grid 1 resistor (bypassed)	2.2	meg
Plate resistance (approx.)	40,000	ohms
Transconductance	3800	μmhos
Plate current	4.5	ma
Grid 2 current	3.5	ma

NOTE:

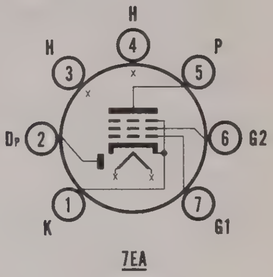
*This tube is intended for use in automobile radios operated from a nominal 12-vol battery. Design of the tube is such that the heater will operate satisfactorily over th range from 10 volts to 15.9 volts, and that the maximum ratings provide a safety facto for the wide voltage variation encountered in this type of supply.

CBS

12CR6



Combined detector and automatic volume controlled audio amplifier



HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.	100	volts

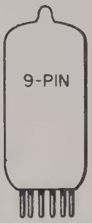
Type 12CR6 is identical to type 6CR6 except for heater ratings.

12CS5 • 12CS6

(See chart for seldom-used tubes)

CBS

12CT8



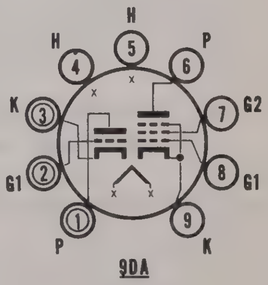
Combined video amplifier and sync separator, amplifier, or clipper, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

Grid to plate: g1 to p	2.2	μμf
Input: g1 to k + h	2.4	μμf
Output: p to k + h	0.19	μμf

Pentode Section

Grid to plate: g1 to p	0.044	μμf
Input: g1 to k + h + g2 + g3	7.5	μμf
Output: p to k + h + g2 + g3	2.4	μμf
Coupling: pentode grid 1 to triode plate, max.	0.010	μμf
Coupling: pentode plate to triode grid, max.	0.016	μμf
Coupling: pentode plate to triode plate, max.	0.16	μμf

12CT8 (cont.)

MAXIMUM RATINGS (Design Maximum values)

	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.5	2.75	watts
Grid 2 dissipation		0.9	watts
Grid 1 circuit resistance			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Triode	Pentode	
Plate voltage	150	200	volts
Grid 2 (screen) voltage		125	volts
Cathode-bias resistor	150	82	ohms
Plate resistance (approx.)		150	kilohms
Transconductance	4900	7000	μmhos
Amplification factor	40		
Plate current	9.0	15	ma
Grid 2 current		3.4	ma
Grid 1 voltage (approx.) for $I_b = 100\ \mu a$	−6.5	−8.0	volts

---

CBS 12CU6

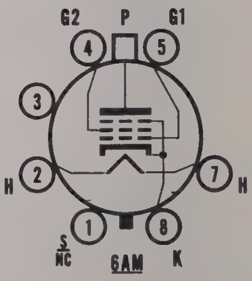
Horizontal deflection amplifier in television receivers, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

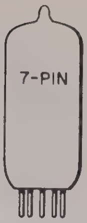
(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



Type 12CU6 is identical to type 6CU6 except for heater characteristics.

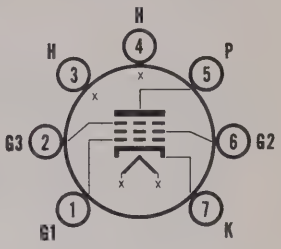
CBS 12CX6



R-f amplifier for 12-volt A and B supply automobile radios

HEATER CHARACTERISTICS*

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts



7BK

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	0.05	μμf
Input: g1 to k + h + g2 + g3	7.6	μμf
Output: p to k + h + g2 + g3	6.2	μμf

MAXIMUM RATINGS (Design maximum values)

Plate voltage	33	volts
Grid 2 voltage	33	volts
Grid voltage, positive d-c	0	volts
Grid 1 circuit resistance	10	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	12.6	volts
Grid 2 (screen) voltage	12.6	volts
Grid 1 (control-grid) voltage†		
Grid 1 resistor	2.2	meg
Plate resistance (approx.)	40,000	ohms
Transconductance▲	3100	μmhos
Plate current	3.0	ma
Grid 2 current	1.4	ma
Grid 1 voltage (approx.) for $I_b = 10$ μa	—4.5	volts

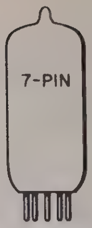
NOTES:

*Type 12CX6 is intended for use in automobile radios operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10 to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variations encountered in this type of supply.

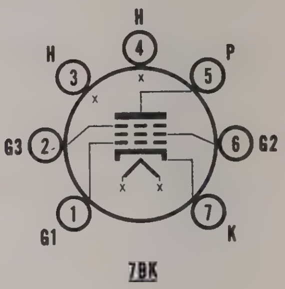
†Contact potential developed across specified grid resistor.

▲Signal applied in series with 1.0 μf grid leak capacitor.

CBS 12CY6



R-f amplifier for 12-volt A and B supply automobile radios



HEATER CHARACTERISTICS*

Voltage, a-c or d-c	12.6	volts
Current	200	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	0.18	µµf
Input: g1 to k + h + g2 + g3	8.5	µµf
Output: p to k + h + g2 + g3	4.0	µµf

MAXIMUM RATINGS (Design maximum values)

Plate voltage	33	volts
Grid 2 voltage	33	volts
Grid 1 circuit resistance	10	meg

CHARACTERISTICS AND TYPICAL OPERATION

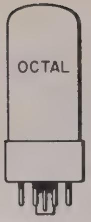
Class A Amplifier

Plate voltage	12.6	volts
Grid 2 (screen) voltage	12.6	volts
Grid 1 (control-grid) voltage	0	volts
Grid 1 resistor	2.2	meg
Plate resistance (approx.)	.14	meg
Transconductance	3250	µmhos
Plate current	1.6	ma
Grid 2 current	0.4	ma
Grid 1 voltage (approx.) for $I_b = 10\ \mu a$	−3.0	volts

NOTE:

*Type 12CY6 is intended for use in automobile radios operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10 volts to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variation encountered in this type of supply.

CBS 12D4



TV damper diode for horizontal deflection circuits, heater warm-up time controlled for series-string circuits

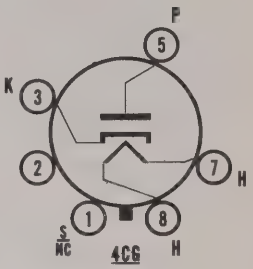
HEATER CHARACTERISTICS

Voltage	12.6	volts
Current	0.6	amps
Peak heater-cathode voltage, max.		
Heater negative to cathode†♦	4400	volts
Heater positive to cathode★	300	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

♦D-c component must not exceed 900 volts max.

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Heater to cathode: h to k	3.0	μμf
Cathode to plate-and-heater: k to p + h▲	8.0	μμf
Plate to cathode-and-heater: p to k + h▲	6.0	μμf

MAXIMUM RATINGS (Design maximum values unless noted)

TV Damper Service*

Plate voltage, peak inverse	4400	volts
Plate current, d-c	155	ma
Plate current, d-c (design center)	145	ma
Plate current, peak	900	ma
Plate dissipation	5.5	watts

AVERAGE CHARACTERISTICS

Tube voltage drop at 250 ma	22	volts

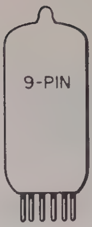
NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

†Absolute maximum value.

▲Tie unused pins and metal parts to heater.

12DB5

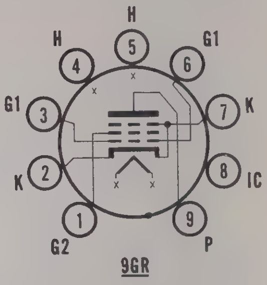


Vertical deflection amplifier for TV receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

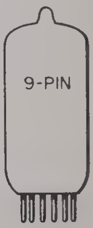
(See Series-String Heaters section of APPENDIX in CBS Tube Manual).



★D-c component must not exceed 100 volts max.

Type 12DB5 is identical to type 6DB5 except for heater characteristics.

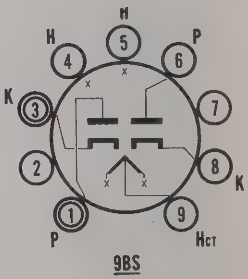
12DF5



Full-wave power rectifier

HEATER CHARACTERISTICS

	Series	Parallel	
Voltage, a-c or d-c	12.6	6.3	volts
Current	0.45	0.90	amp
Peak heater-cathode voltage			
A-c, rms		225	volts
D-c		450	volts



ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Rectifier Service

Plate voltage, peak inverse		1275	volts
Plate supply voltage, rms (each plate)	RATING CHART I*	450	volts
Output current, d-c	RATING CHART I*		
Plate current, peak steady state (each plate)	RATING CHART II*	0.35	amp
Plate current, peak transient (each plate)	RATING CHART III*	2.0	amp

CHARACTERISTICS

Tube Voltage Drop

Conducting 100 ma (each plate)	40	volts

TYPICAL OPERATION

Full-Wave Rectifier (Capacitor Input Filter)

Plate supply voltage, rms (each plate)	325	volts
Plate supply resistance (each plate)	82	ohms
Filter input capacitor	40	μf
Output current, d-c	100	ma
Output voltage at filter input, d-c	330	volts

Full-Wave Rectifier (Choke Input Filter)

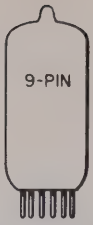
Plate supply voltage, rms (each plate)	450	volts
Filter input choke	10	henrys
Output current, d-c	100	ma
Output voltage at filter input, d-c	360	volts

NOTES:

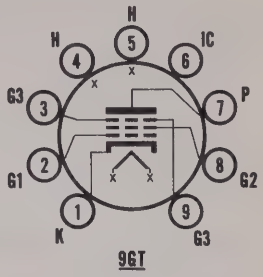
*Rating Charts given in APPENDIX of CBS Tube Manual.

†A-c plate voltage is measured without load.

12DK5



I-f or r-f amplifier for 12-volt A and B supply automobile radios



9GT

EATER CHARACTERISTICS*

Voltage, a-c or d-c	12.6	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	16	volts
Heater positive to cathode.	16	volts

ELECTRICAL DATA

IRECT INTERELECTRODE CAPACITANCES—Shield♦

Grid to plate: g1 to p, max.	.045	μμf
Input: g1 to k + h + g2 + g3	9.5	μμf
Output: p to k + h + g2 + g3	2.65	μμf

♦JETEC shield 315 connected to cathode

AXIMUM RATINGS (Design maximum values)

Plate voltage	16	volts
Grid 2 voltage	16	volts
Grid voltage, positive d-c	0	volts

HARACTERISTICS AND TYPICAL OPERATION

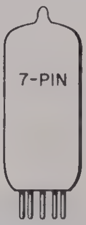
Class A Amplifier

Plate voltage	12.6	volts
Grid 3 (suppressor)	0	volts
Grid 2 (screen) voltage	12.6	volts
Plate resistance (approx.)	0.1	meg
Transconductance	3300	μmhos
Plate current	2.0	ma
Grid 2 current	0.65	ma
Grid 1 voltage (approx.) for $I_b = 10$ μa	2.5	volts
Grid leak resistor (bypassed)	2.2	meg

OTE:

*Type 12DK5 is intended for use in automobile radios operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10 to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variations encountered in this type of supply.

12DM5



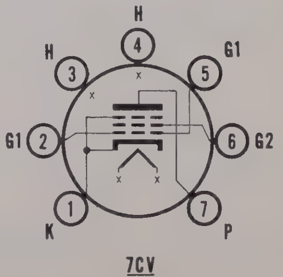
Beam power audio output amplifier

EATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



7CV

12DM5 (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.55	μμf
Input: g1 to k + h + g2 + b.p.	13	μμf
Output: p to k + h + g2 + b.p.	9.0	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	135	volts
Grid 2 voltage	117	volts
Plate dissipation	5.5	watts
Grid 1 circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg
Bulb temperature at hottest point	250	°C

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	110	volts
Grid 2 (screen) voltage	110	volts
Plate resistance (approx.)	14,000	ohms
Transconductance	7500	μmhos
Grid 1 input voltage, peak a-f	7.5	volts
Plate current, zero signal	49	ma
Plate current, maximum signal	50	ma
Grid 2 current, zero signal	4.0	ma
Grid 2 current, maximum signal	8.5	ma
Load resistance impedance	2500	ohms
Total harmonic distortion (approx.)	9	%
Power output, maximum signal	1.9	watts

CBS

12DQ6

12DQ6A

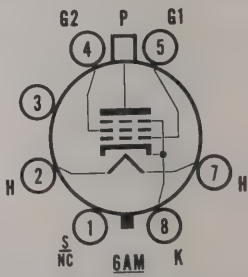
High efficiency horizontal deflection amplifier for television receivers, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.

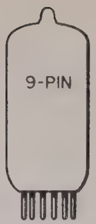


Types 12DQ6 and 12DQ6A are identical to type 6DQ6 and 6DQ6A respectively, except for heater characteristics.

12F5GT

(See chart for seldom-used tubes)

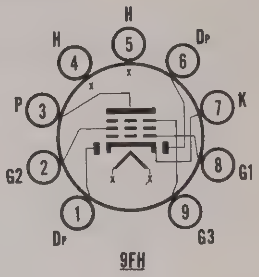
12F8



Combined detector—a-f voltage amplifier for 12-volt A and B supply automobile radios

HEATER CHARACTERISTICS*

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode.	30	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	.06	μμf
Input: g1 to k + h + g2 + g3	4.5	μμf
Output: p to k + h + g2 + g3	3.0	μμf
Diode 1 to diode 2	0.3	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	30	volts
Grid 2 voltage	30	volts
Grid voltage, positive d-c	0	volts
Diode current, average	1.0	ma
Grid 1 circuit resistance	10	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	12.6	volts
Grid 3 (suppressor)	connected to cathode at socket	
Grid 2 (screen) voltage	12.6	volts
Grid 1 (control-grid) voltage	0	volts
Plate resistance (approx.)	.33	meg
Transconductance	1000	μmhos
Plate current	1.0	ma
Grid 2 current	0.38	ma
Grid 1 voltage (approx.) for g_m = 10 μmhos	−5.0	volts
Average diode current with 10 volts, d-c, applied	2.0	ma

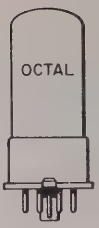
NOTE:

*Type 12F8 is intended for use in automobile radios operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10 volts to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variation encountered in this type of supply.

12G4 • 12H4 • 12H6

(See chart for seldom-used tubes)

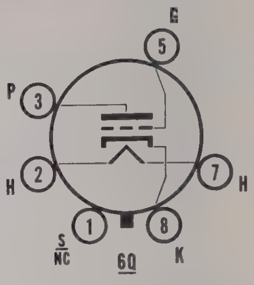
CBS 12J5GT



Audio voltage amplifier or phase inverter and general purpose triode amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

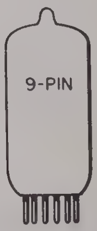


Type 12J5GT is identical to type 6J5GT except for heater characteristics.

12J7G/GT

(See chart for seldom-used tubes)

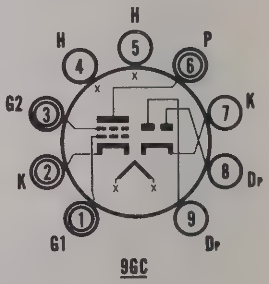
CBS 12J8



Detector and power amplifier driver for 12-volt A and B supply automobile radios

HEATER CHARACTERISTICS*

Voltage, a-c or d-c	12.6	volts
Current	325	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode.	30	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Tetrode grid to plate: g1 to p	0.70	μμf
Tetrode input: g1 to Tk + h + g2	10.5	μμf
Tetrode output: p to Tk + h + g2	4.4	μμf
Diode 1 plate to tetrode grid 1, max.	0.04	μμf
Diode 2 plate to tetrode grid 1, max.	0.015	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	30	volts
Grid 2 voltage	30	volts
Average diode current, each diode	5.0	ma
Grid 1 circuit resistance	10	meg

12J8 (cont.)

TYPICAL OPERATION

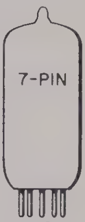
Class A Driver Amplifier

Plate voltage	12.6	volts
Grid 2 (screen) voltage	12.6	volts
Grid 1 (control-grid) voltage	0	volts
Grid 1 resistor	2.2	meg
Plate resistance (approx.)	6000	ohms
Transconductance	5500	μmhos
Grid 1 input voltage, a-f (rms)	1.6	volts
Plate current, zero signal	12	ma
Grid 1 resistor bypass capacitor	1.0	μf
Grid 2 current, zero signal	1.5	ma
Load resistance impedance	2700	ohms
Total harmonic distortion (approx.)	5	%
Power output, maximum signal	20	mw
Average diode 1 current at 5.0 volts d-c	8.5	ma
Average diode 2 current at 5.0 volts d-c	12.0	ma

NOTE:

*Type 12J8 is intended for use in automobile radios operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10.0 volts to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variation encountered in this type of supply.

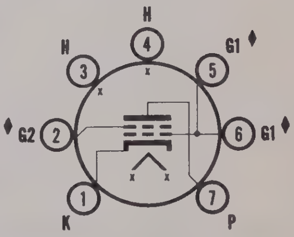
CBS 12K5



Space-charge power amplifier driver for 12-volt A and B supply automobile radios

HEATER CHARACTERISTICS

Voltage, a-c or d-c*	12.6	volts
Current	400	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts



7FD

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Plate voltage	30	volts
Grid 1 (space-charge) voltage, positive d-c (absolute max.)	16	volts
Grid 1 supply voltage	30	volts
Grid 2 (control-grid) voltage, negative d-c	—20	volts
Grid 2 circuit resistance	10	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Driver

Plate voltage	12.6	12.6	volts
Grid 2 (control-grid) voltage	—2.0▲	—0.5†	volts
Grid 1 (space-charge grid) voltage	12.6	12.6	volts
Plate resistance		480	ohms
Transconductance (grid 2 to plate)		15,000	μmhos
Amplification (grid 2 to plate)		7.2	
Peak a-f grid 2 voltage	2.5		volts
A-f signal source resistance	100,000		ohms
Load resistance	800		ohms
Plate current	8.0	40	ma
Grid 1 current	75	75	ma
Power output	40		mw
Total harmonic distortion	10		%

NOTES:

*Type 12K5 is intended for use in automobile radios operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10.0 volts to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variation encountered in this type of supply.

†Average bias developed across a 2.2 meg. resistor.

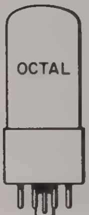
▲Measured across a 2.2 meg. resistor by grid 2 rectification with a zero plate signal equal to approximately 40 ma.

♦Grid 1 space-charge grid. Grid 2 control-grid.

12K7G/GT • 12K8/GT

(See chart for seldom-used tubes)

CBS 12L6GT



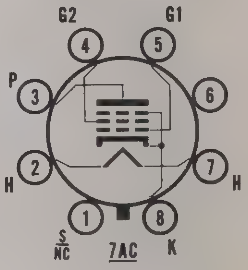
Audio power output tube in TV receivers, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	300	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Plate voltage	200	volts
Grid 2 voltage	125	volts
Plate dissipation	10	watts
Grid 2 dissipation	1.25	watts
Grid 1 circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

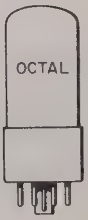
Plate voltage	110	200	volts
Grid 2 (screen) voltage	110	125	volts
Grid 1 (control-grid) voltage	—7.5		volts
Cathode bias resistor		180	ohms
Plate resistance (approx.)	13,000	28,000	ohms
Transconductance	8000	8000	μmhos
Grid 1 input voltage, peak a-f	7.5	8.5	volts
Plate current, zero signal	49	46	ma
Plate current, maximum signal	50	47	ma
Grid 2 current, zero signal	4.0	2.2	ma
Grid 2 current, maximum signal	10	8.5	ma
Load resistance impedance	2000	4000	ohms
Power output, maximum signal	2.1	3.8	watts
Total harmonic distortion	10	10	%

12L8GT • 12Q7G/GT • 12S8

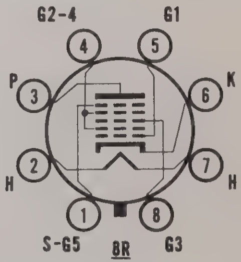
(See chart for seldom-used tubes)

CBS

12SA7GT



Pentagrid converter for radio receivers



HEATER CHARACTERISTICS

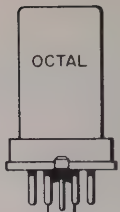
Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.	90	volts

Type 12SA7GT is identical to type 6SA7GT except for heater characteristics.

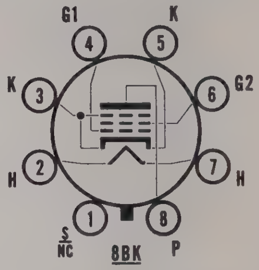
12SC7 • 12SF5/GT • 12SF7

(See chart for seldom-used tubes)

12SG7



R-f or i-f amplifier in wideband applications



HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

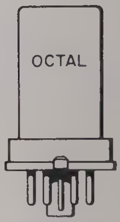
Type 12SG7 is identical to type 6SG7 except for heater characteristics.

12SH7 • 12SJ7/GT

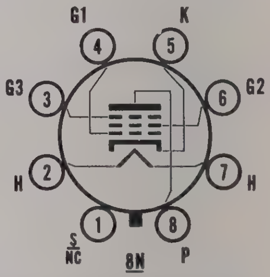
(See chart for seldom-used tubes)

12SK7

12SK7GT



Gain controlled r-f or i-f amplifier in radio receivers



HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	150	ma

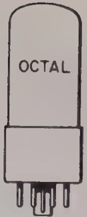
Types 12SK7 and 12SK7GT are identical to types 6SK7 and 6SK7GT, respectively except for heater characteristics.

12SL7GT

(See chart for seldom-used tubes)

12SN7GT

12SN7GTA



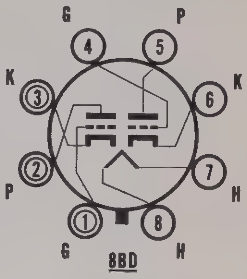
General purpose amplifier, phase inverter or oscillator

HEATER CHARACTERISTICS

Voltage, a-c or d-c..........	12.6	volts
Current.....................	300	ma

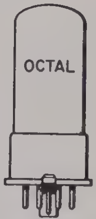
12SN7GTA

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).



Type 12SN7GT is identical to type 6SN7GT except for heater characteristics. Type 12SN7GTA is identical to type 6SN7GTB except for heater characteristics.

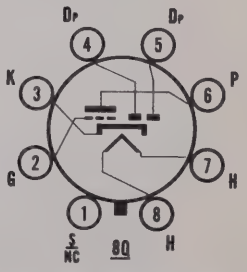
12SQ7GT



Combined detector, avc, and audio amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c..........	12.6	volts
Current.....................	150	ma
Peak heater-cathode voltage, max.............	90	volts

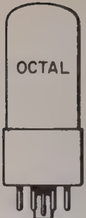


Type 12SQ7GT is identical to type 6SQ7GT except for heater characteristics.

12SR7

(See chart for seldom-used tubes)

12V6GT

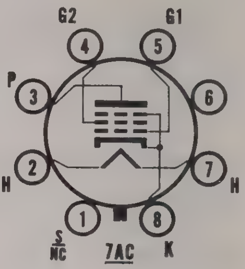


Audio power output amplifier for 12-volt system automobile radios

HEATER CHARACTERISTICS

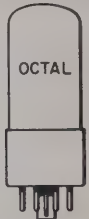
Voltage, a-c or d-c	12.6	volts
Current	225	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode★	100	volts

★D-c component must not exceed 100 volts max.



Type 12V6GT is identical to type 6V6GT except for heater characteristics.

12W6GT



Audio output amplifier or vertical deflection amplifier, heater warm-up controlled for series strings

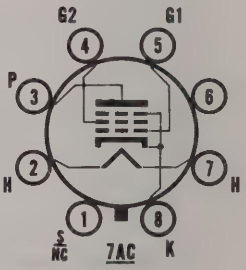
HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode★	300	volts
Heater positive to cathode†	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

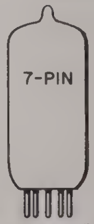
★D-c component must not exceed 200 volts max.

†D-c component must not exceed 100 volts max.



Type 12W6GT is identical to type 6W6GT except for heater characteristics.

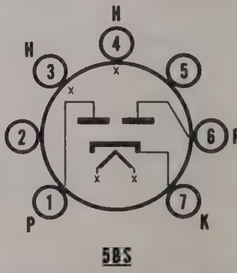
12X4



Full-wave rectifier for 12-volt system automobile receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	450	volts
Heater positive to cathode	100	volts



Type 12X4 is identical to type 6X4 except for heater characteristics.

12Z3 • 12Z5 • 13DE7 • 14A4 14A5 • 14A7 • 14AF7/XXD • 14B6 14B8 • 14C5 • 14C7 • 14E6 • 14E7 14F7 • 14F8 • 14H7 • 14J7 • 14N7 14Q7 • 14R7 • 14S7 • 14W7 • 14X7 14Y4 • 14Z3 • 15 • 16 • 16B

(See chart for seldom-used tubes)

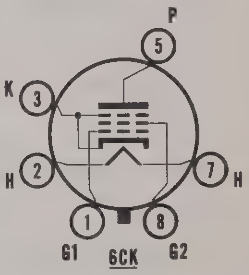
CBS 17AV5GA

Horizontal deflection amplifier in TV receiver sweep circuits, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

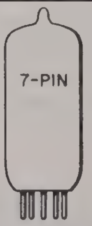
Voltage, a-c or d-c	16.8	volts
Current	450	ma
Peak heater-cathode, voltage max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

★D-c volts must not exceed 100 volts, max.



Type 17AV5GA is identical to types 6AV5GA, 12AV5GA, and 25AV5GA except for heater characteristics. See type 6AV5GA for ratings and operating characteristics.

CBS 17CA5



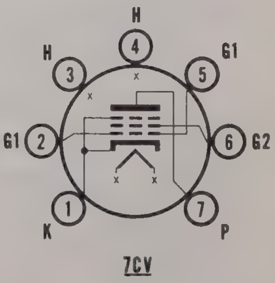
A-f power amplifier with high output from a low B supply voltage, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	16.8	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode★	200	volts
Heater positive to cathode†	300	volts
Warm-up time	11 secs. average	

★D-c component must not exceed 100 volts max.

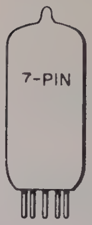
†D-c component must not exceed 200 volts max.



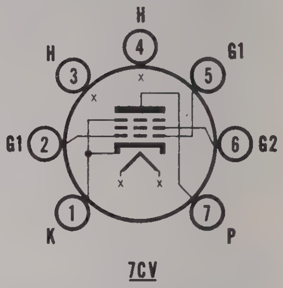
Type 17CA5 is identical to type 12CA5 except for heater ratings, and to 6CA5 and 25CA5 except for a maximum grid 1 circuit resistance (fixed bias) rating of 0.1 megohm and heater ratings. See type 6CA5 for ratings and operating characteristics.

CBS

17CU5



Audio output power tube for television receivers, heater warm-up time controlled for series strings



HEATER CHARACTERISTICS

Voltage, a-c or d-c	16.8	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode	200	volts
Warm-up time	11	secs. average

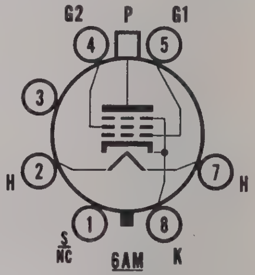
Type 17CU5 is identical to type 6CU5 except for heater characteristics.

CBS

17DQ6

17DQ6A

High efficiency horizontal deflection amplifier for television receivers



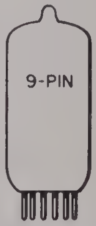
HEATER CHARACTERISTICS

Voltage, a-c or d-c	16.8	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode	200	volts
Warm-up time	11	secs. average

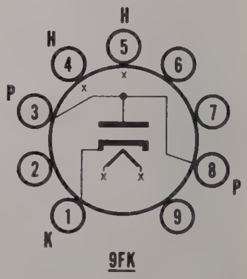
Type 17DQ6 is identical to type 6DQ6 except for heater characteristics; type 17DQ6A is identical to type 6DQ6A. See types 6DQ6 and 6DQ6A for ratings and operating characteristics.

CBS

17H3



TV damper diode for horizontal deflection circuits, warm-up time controlled for series strings



HEATER CHARACTERISTICS

Voltage, a-c or d-c	17.5	volts
Current	300	ma
Peak heater-cathode voltage, max.*		
Heater negative to cathode♦	2000	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

♦D-c component must not exceed 500 volts max.

★D-c component must not exceed 100 volts max.

17H3 (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Heater to cathode: h to k	2.0	μμf
Cathode to plate-and-heater: k to p + h	5.5	μμf
Plate to cathode-and-heater: p to k + h	4.0	μμf

MAXIMUM RATINGS (Design maximum values unless noted)
TV Damper Service*

Plate voltage, peak inverse	2000	volts
Plate current, d-c	75	ma
Plate current, peak steady-state	450	ma
Plate dissipation	3.0	watts

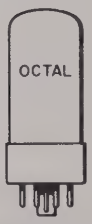
AVERAGE CHARACTERISTICS

Tube voltage drop at 140 ma	22	volts

NOTE:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

CBS 17L6GT



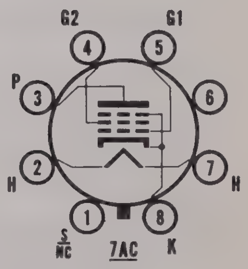
Audio power output tube in TV receivers, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	16.8	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	300	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

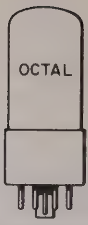
★D-c component must not exceed 100 volts max.



Type 17L6GT is identical to types 12L6GT, 25L6GT, and 50L6GT except for heater characteristics. See type 12L6GT for ratings and operating characteristics.

CBS

18A5



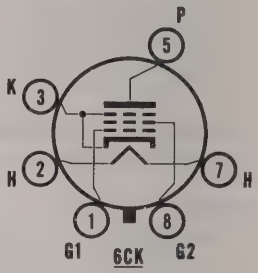
Horizontal deflection amplifier for TV receivers, heater warm-up time controlled for series string circuits

HEATER CHARACTERISTICS

Voltage, a-c or d-c	18.5	volts
Current	0.30	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.7	μμf
Input: g1 to k + h + g2 + b.p.	13.0	μμf
Output: p to k + h + g2 + b.p.	7.0	μμf

MAXIMUM RATINGS (Design maximum values unless noted)

Horizontal Deflection Amplifier*

Plate supply voltage, d-c (boost + d-c power supply)	350	volts
Plate voltage, peak pos. (absolute max.)	3000	volts
Plate voltage, peak negative pulse	600	volts
Grid 2 voltage, d-c	160	volts
Grid 1 voltage, peak negative	250	volts
Plate dissipation†	9.0	watts
Grid 2 dissipation	2.5	watts
Cathode current, average	90	ma
Cathode current, peak	310	ma
Grid 1 circuit resistance	1.0	meg
Bulb temperature at hottest point	190	°C

AVERAGE CHARACTERISTICS

Plate voltage	60	200	volts
Grid 2 (screen) voltage	125	125	volts
Grid 1 (control-grid) voltage	0‡	—17	volts
Plate resistance (approx.)		27,000	ohms
Transconductance		4800	μmhos
Plate current	165	40	ma
Grid 2 current	15	1.1	ma
Grid 1 voltage (approx.) for $I_b = 1.0$ ma		—36	volts

Triode Connected

Plate and grid 2 voltage (p + g2 tied together)	125	volts
Grid 1 voltage	—17	volts
Amplification factor	4.6	

NOTES:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30-frame system.

†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

‡Applied only for 2 seconds maximum so as not to damage tube.

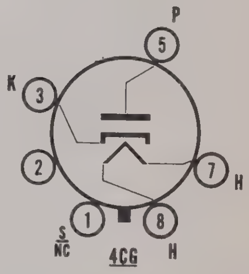
19AU4GT

19AU4GTA

Damper diode in horizontal deflection circuits of TV receivers, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	18.9	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode†	4500	volts
Heater positive to cathode★	300	volts



19AU4GTA

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

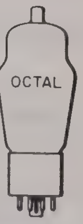
†D-c component must not exceed 900 volts.

★D-c component must not exceed 100 volts.

Types 19AU4GT and 19AU4GTA are identical to types 6AU4GT and 6AU4GTA, respectively, except for heater characteristics.

19BG6G

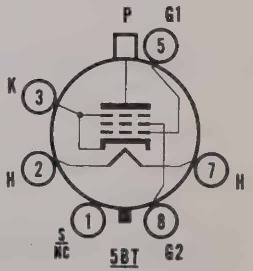
19BG6GA



Horizontal deflection amplifier for television receiver sweep circuits

HEATER CHARACTERISTICS

Voltage, a-c or d-c	18.9	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts



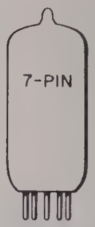
★D-c component must not exceed 100 volts, max.

Types 19BG6G and 19BG6GA are identical to types 6BG6G and 6BG6GA, respectively, except for heater characteristics.

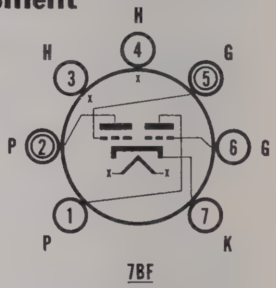
19C8

(See chart for seldom-used tubes)

CBS 19J6



Vhf oscillator, amplifier, or mixer used in series string heater equipment



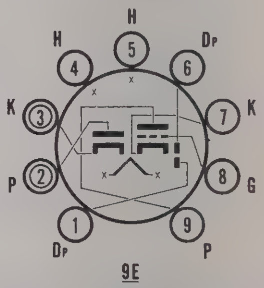
HEATER CHARACTERISTICS

Voltage, a-c or d-c	18.9	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

Type 19J6 is identical to type 5J6 and 6J6 except for heater characteristics. See type 5J6 for ratings and characteristics.

CBS 19T8

Combined a-m, f-m detector and audio amplifier



HEATER CHARACTERISTICS

Voltage, a-c or d-c	18.9	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

Type 19T8 is identical to type 5T8 and 6T8 except for heater characteristics. See type 5T8 for ratings and characteristics.

19V8 • 19X8 • 20 • 22 • 24A • 25 25A6/G/GT • 25A7GT 25AC5GT

(See chart for seldom-used tubes)

25AV5GT

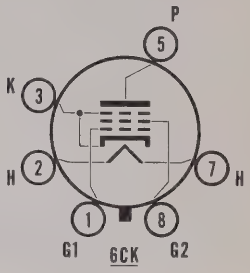
25AV5GA

Horizontal deflection amplifier for television receiver sweep circuits

HEATER CHARACTERISTICS

Voltage, a-c or d-c	25.0	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.

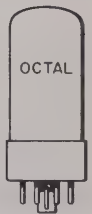


25AV5GA

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

Types 25AV5GA and 25AV5GT are identical to types 6AV5GA and 6AV5GT, respectively, except for heater characteristics.

25AX4GT

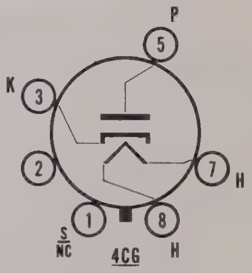


Damper diode for television horizontal sweep circuits

HEATER CHARACTERISTICS

Voltage, a-c or d-c	25.0	volts
Current	300	ma
Peak heater-cathode voltage, max.*		
Heater negative to cathode	4000	volts
Heater positive to cathode	100	volts

*Voltage pulse duration must not exceed 10 µs in a 525 line, 30-frame system.

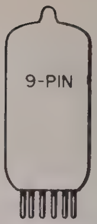


Type 25AX4GT is identical to types 6AX4GT and 12AX4GT except for heater characteristics. See type 6AX4GT for ratings and characteristics.

25B5 • 25B6G • 25B8

(See chart for seldom-used tubes)

CBS 25BK5

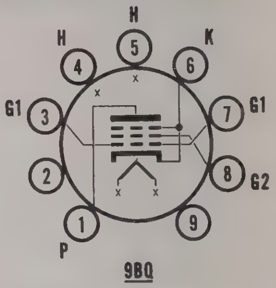


General purpose power amplifier for service where driving voltage is limited

HEATER CHARACTERISTICS

Voltage, a-c or d-c	25	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode★	100	volts

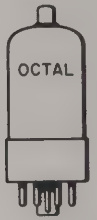
★D-c component must not exceed 100 volts max.



Type 25BK5 is identical to types 6BK5, 12BK5, and 50BK5 except for heater characteristics. See type 6BK5 for ratings and characteristics.

CBS 25BQ6GT

25BQ6GA • 25BQ6GTB

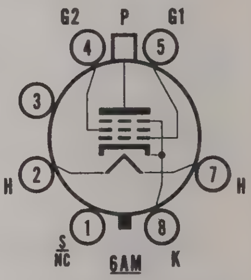


Horizontal deflection amplifier for television receivers

HEATER CHARACTERISTICS

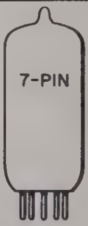
Voltage, a-c or d-c	25.0	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



Types 25BQ6GA, 25BQ6GT, and 25BQ6GTB are identical to types 6BQ6GA, 6BQ6GT, and 6BQ6GTB, respectively, except for heater characteristics.

CBS 25C5

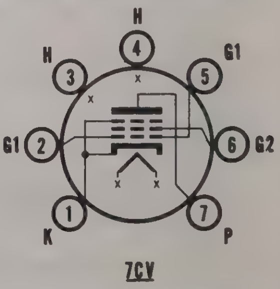


Audio power output amplifier in a-c/d-c receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	25	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

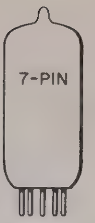
★D-c component must not exceed 100 volts max.



Type 25C5 is identical to types 12C5 and 50C5 except for heater characteristics. See type 12C5 for ratings and characteristics.

CBS

25CA5

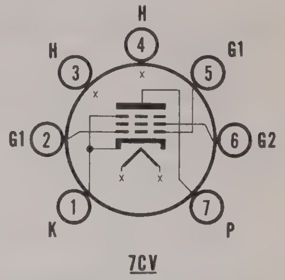


A-f power amplifier with high output from a low B supply voltage

HEATER CHARACTERISTICS

Voltage, a-c or d-c	25.0	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



Type 25CA5 is identical to type 6CA5 and 12CA5 except for heater characteristics. See type 6CA5 for ratings and characteristics.

CBS

25CD6G

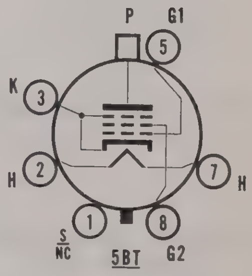
25CD6GA
25CD6GB

High efficiency horizontal deflection amplifier for television receivers, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	25.0	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



25CD6GA and 25CD6GB

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual).

Types 25CD6G and 25CD6GA are identical to type 6CD6G except for heater characteristics. Type 25CD6GB is identical to type 6CD6GA except for heater characteristics.

CBS

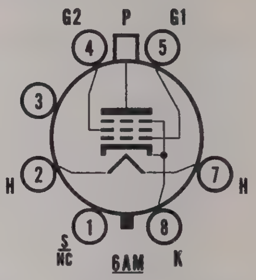
25CU6

Horizontal deflection output tube for television receivers with 300-ma series string heater circuits

HEATER CHARACTERISTICS

Voltage, a-c or d-c..........	25.0	volts
Current.....................	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode................	200	volts
Heater positive to cathode★..............	200	volts

★D-c component must not exceed 100 volts max.



Type 25CU6 is identical to types 6CU6 and 12CU6 except for heater characteristics. See type 6CU6 for ratings and characteristics.

25D8GT

(See chart for seldom-used tubes)

CBS

25DN6

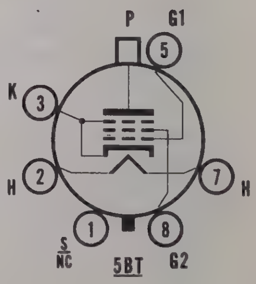
Horizontal deflection amplifier with low-voltage, high-current characteristics, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c..........	25.0	volts
Current.....................	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode................	200	volts
Heater positive to cathode★...............	200	volts
Warm-up time......	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component 100 volts max.



Type 25DN6 is identical to type 6DN6 except for heater characteristics.

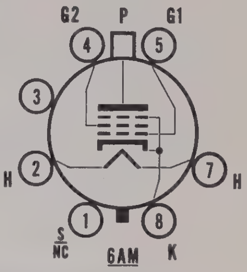
25DQ6

Horizontal deflection output amplifier with extremely high power sensitivity and high perveance

HEATER CHARACTERISTICS

Voltage, a-c or d-c	25.0	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts, max.



Type 25DQ6 is identical to types 6DQ6 and 12DQ6 except for heater characteristics. See type 6DQ6 for ratings and characteristics.

25EC6

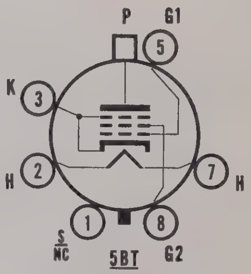
110° horizontal deflection amplifier for TV receivers, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	25	volts
Current	0.6	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.6	μμf
Input: g1 to k + h + g2 + b.p.	24	μμf
Output: p to k + h + g2 + b.p.	10	μμf

MAXIMUM RATINGS (Design maximum values unless noted)

Horizontal Deflection Amplifier*

Plate supply voltage, d-c (boost + d-c power supply)	700	volts
Plate voltage, peak positive pulse	7000	volts
Plate voltage, peak negative pulse	1500	volts
Grid 2 voltage, d-c	175	volts
Grid 1 voltage, peak negative	300	volts
Plate dissipation†	10	watts
Grid 2 dissipation	4.0	watts
Cathode current, average	200	ma
Cathode current, peak	700	ma
Grid 1 circuit resistance, grid leak bias	1.5	meg
Bulb temperature at hottest point	225	°C

25EC6 (cont.)

AVERAGE CHARACTERISTICS

Plate voltage	60	135	volts
Grid 2 (screen) voltage	135	135	volts
Grid 1 (control-grid) voltage	0‡	−22.5	volts
Plate resistance (approx.)		4700	ohms
Transconductance		7500	µmhos
Plate current	350	70	ma
Grid 2 current	40	4.5	ma
Grid 1 voltage (approx.) for $I_b = 1.0$ ma		−42	volts
Triode amplification factor (p + g2 tied together)		3.8	

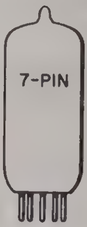
NOTES:

*Voltage pulse duration must not exceed 10 µs in a 525-line, 30-frame system.

†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

‡Applied only for two seconds maximum so as not to damage tube.

CBS 25F5

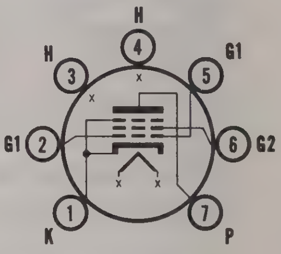


Beam power amplifier for a-c/d-c radio receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	25	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



7CV

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.57	µµf
Input: g1 to k + h + g2 + b.p.	12.0	µµf
Output: p to k + h + g2 + b.p.	6.0	µµf

MAXIMUM RATINGS (Design center values)

Plate voltage	135	volts
Grid 2 voltage	117	volts
Plate dissipation	4.5	watts
Grid 1 circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION

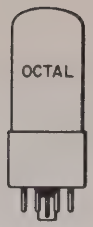
Class A Amplifier	Single tube	Two tubes (Push pull)	
Plate voltage	110	110	volts
Grid 2 (screen) voltage	110	110	volts
Grid 1 (control-grid) voltage	−7.5	−8.0	volts
Plate resistance (approx.)	16,000		ohms
Transconductance	5800		µmhos
Grid 1 input voltage, peak a-f	7.5	16†	volts
Plate current, zero signal	36	70	ma
Plate current, maximum signal	37	78	ma
Grid 2 current, zero signal	3.0	7.5	ma
Grid 2 current, maximum signal	7.0	13.6	ma
Load resistance impedance	2500	4500	ohms
Total harmonic distortion (approx.)	10	2.6	%
Power output, maximum signal	1.2	2.9	watts

NOTE:

†Grid to grid.

CBS

25L6GT

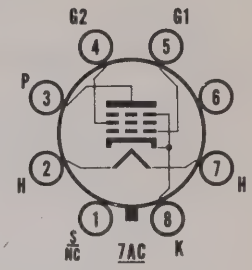


Audio power output amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	25.0	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



Type 25L6GT is identical to types 12L6GT and 50L6GT except for heater characteristics. See type 12L6GT for ratings and characteristics.

25N6G • 25Y5

(See chart for seldom-used tubes)

CBS 25W4GT

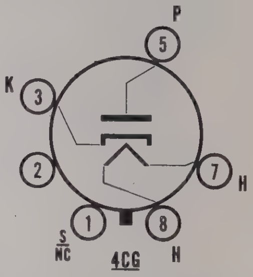
Damper diode in horizontal sweep circuits of television receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	25.0	volts
Current	300	ma
Peak heater-cathode voltage, max.†		
Heater negative to cathode	500	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts, max.

†Voltage pulse duration must not exceed 10 μs in a 525, 30-frame system.

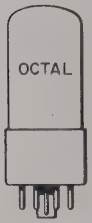


Type 25W4GT is identical to type 6W4GT except for heater characteristics and capacitances. Direct interelectrode capacitances are not specified by RETMA for the 25W4GT.

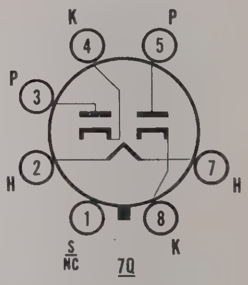
25W6GT • 25Z5

(See chart for seldom-used tubes)

CBS 25Z6GT



H-w rectifier or voltage doubler for a-c/d-c receivers



HEATER CHARACTERISTICS

Voltage, a-c or d-c	25.0	volts
Current	0.3	amp
Peak heater-cathode voltage, max.	350	volts

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Rectifier or Doubler Service

Plate voltage, peak inverse	700	volts
Output current, d-c	0.075	amp
Plate current, peak steady state (each plate)	0.45	amp

CHARACTERISTICS

Tube Voltage Drop

Conducting 150 ma (each plate)	22	volts

TYPICAL OPERATION

Half-Wave Rectifier (Capacitor Input Filter)

Plate supply voltage, rms (each plate)	117	235	volts
Plate supply resistance (each plate)†	15	100	ohms
Filter input capacitor	16	16	μf
Output current, d-c (each plate)	75	75	ma
Output voltage at filter input, d-c	115	255	volts

25Z6GT (cont.)

TYPICAL OPERATION

Voltage Doubler

	Half-Wave	Full-Wave	
Plate supply voltage, rms (each plate)	117	117	volts
Filter input capacitor	16	16	μf
Plate supply impedance (each plate)	30	15	ohms
Output current, d-c	75	75	ma
Output voltage at filter input, d-c			
At half-load current of 37.5 ma		250	volts
At full-load current of 75 ma		205	volts

NOTES:

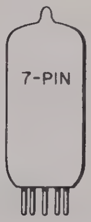
*As a half-wave rectifier, the two sections may be used separately or in parallel.

†When filter capacitors larger than 40 μf are used it may be necessary to increase plate supply resistance above the value given.

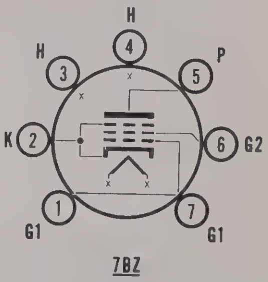
26 • 26A6 • 26A7 • 26C6 • 26D6 27 • 28Z5 • 30 • 31 • 32 • 32L7GT 33 • 34 • 35/51 • 35A5

(See chart for seldom-used tubes)

CBS 35B5



Beam power amplifier for a-c/d-c radio receivers



HEATER CHARACTERISTICS

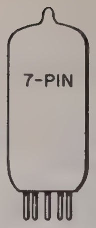
Voltage, a-c or d-c	35	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	180	volts
Heater positive to cathode	180	volts

Type 35B5 is identical to type 35C5 except for basing and direct interelectrode capacitances.

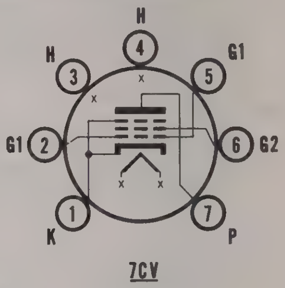
DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.7	μμf
Input: g1 to k + h + g2 + b.p.	12	μμf
Output: p to k + h + g2 + b.p.	9	μμf

CBS 35C5



Beam power amplifier for a-c/d-c radio receivers



HEATER CHARACTERISTICS

Voltage, a-c or d-c	35	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	180	volts
Heater positive to cathode	180	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.60	μμf
Input: g1 to k + h + g2 + b.p.	12	μμf
Output: p to k + h + g2 + b.p.	9.0	μμf

MAXIMUM RATINGS (Design center values)

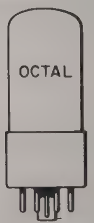
Plate voltage	135	volts
Grid 2 voltage	117	volts
Plate dissipation	4.5	watts
Grid 2 dissipation	1.0	watts
Grid 1 circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg
Bulb temperature at hottest point	250	°C

CHARACTERISTICS AND TYPICAL OPERATION

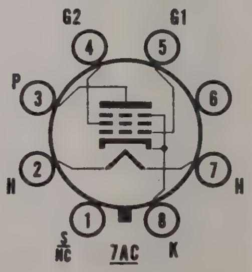
Class A Amplifier

Plate voltage	110	volts
Grid 2 (screen) voltage	110	volts
Grid 1 (control-grid) voltage	−7.5	volts
Transconductance	5800	μmhos
Grid 1 input voltage, peak a-f	7.5	volts
Plate current, zero signal	40	ma
Plate current, maximum signal	41	ma
Grid 2 current, zero signal	3	ma
Grid 2 current, maximum signal	7	ma
Load resistance impedance	2500	ohms
Total harmonic distortion (approx.)	10	%
Power output, maximum signal	1.5	watts

CBS 35L6GT



Beam power amplifier for a-c/d-c radio receivers



HEATER CHARACTERISTICS

Voltage, a-c or d-c	35.0	volts
Current	150	ma
Peak heater-cathode voltage, max.	90	volts

35L6GT (cont.)

ELECTRICAL DATA

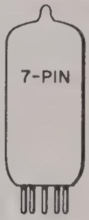
MAXIMUM RATINGS (Design center values)

Plate voltage	200	volts
Grid 2 voltage	125	volts
Plate dissipation	8.5	watts
Grid 2 dissipation	1.0	watts
Grid circuit resistance		
Fixed bias	0.1	meg
Self bias	0.5	meg

CHARACTERISTICS AND TYPICAL OPERATION
Class A Amplifier

Plate voltage	110	200	volts
Grid 2 (screen) voltage	110	125	volts
Grid 1 (control-grid) voltage	−7.5	0	volts
Cathode bias resistor	0	180	ohms
Plate resistance (approx.)	14,000	34,000	ohms
Transconductance	5800	6100	μmhos
Grid 1 input voltage, peak a-f	7.5	8.0	volts
Plate current, zero signal	40	43	ma
Plate current, maximum signal	41	43	ma
Grid 2 current, zero signal	3.0	2.0	ma
Grid 2 current, maximum signal	7.0	5.5	ma
Load resistance impedance	2500	5000	ohms
Total harmonic distortion (approx.)	10	10	%
Power output, maximum signal	1.5	3.0	watts

CBS 35W4

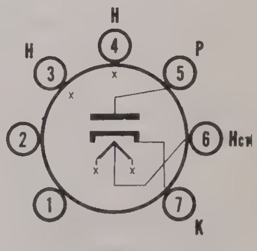


Half-wave rectifier for a-c/d-c radio receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c★	35	volts
Current★	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	330	volts
Heater positive to cathode	330	volts

★Value given for operation without panel lamp. For values with panel lamp, refer to Typical Operation.



5BQ

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)
Half-Wave Rectifier Service

Plate voltage, peak inverse	330	volts
Plate current, peak steady state	600	ma
Output current, d-c		
With panel lamp but no shunting resistor	60	ma
With panel lamp and a shunting resistor*	90	ma
Without panel lamp	100	ma
Panel lamp voltage, rms		
When panel lamp fails	15	volts

CHARACTERISTICS
Tube Voltage Drop

Conducting 200 ma at plate	18	volts

35W4 (cont.)

TYPICAL OPERATION

Capacitor Input Filter with No. 40 or No. 47 Panel Lamp

Heater voltage (pin 3 to pin 4)	32	32	32	32	volts
Heater tap voltage (pin 4 to pin 6)	5.5	5.5	5.5	5.5	volts
Heater current (between pins 3 and 6)	150	150	150	150	ma
Plate supply voltage, rms	117	117	117	117	volts
Filter input capacitor	40	40	40	40	µf
Plate supply impedance	15	15	15	15	ohms
Panel lamp shunting resistor		300	150	100	ohms
Output current, d-c	60	70	80	80	ma

Capacitor Input without Panel Lamp†

Heater voltage (pin 3 to pin 4)	35	volts
Heater tap voltage (pin 4 to pin 6)	7.5	volts
Heater current (between pins 3 and 4)	150	ma
Plate supply voltage, rms	117	volts
Filter input capacitor	40	µf
Plate supply impedance	15	ohms
Output current, d-c	100	ma
Output voltage at filter input, d-c		
At half-load current of 50 ma	140	volts
At full-load current of 100 ma	120	volts
Voltage regulation (approx.)		
Half-load to full-load current	20	volts

MAXIMUM CIRCUIT VALUES

Panel lamp shunting resistor*		
For d-c output current of 70 ma	800	ohms
For d-c output current of 80 ma	400	ohms
For d-c output current of 90 ma	250	ohms

NOTES:

*Required when d-c output current exceeds 60 ma.

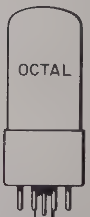
†Plate current must not flow through tap section.

35Y4 • 35Z3

(See chart for seldom-used tubes)

CBS

35Z5GT

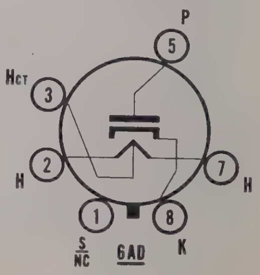


Half-wave rectifier for a-c/d-c radio receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c★	35	volts
Current★	150	ma
Peak heater-cathode voltage		
Heater negative to cathode	350	volts
Heater positive to cathode	350	volts

★Value given for operation without panel lamp. For values with panel lamp, refer to Typical Operation.



35Z5GT (cont.)

ELECTRICAL DATA

MAXIMUM RATINGS

	With No. 40 or No. 47 Panel Lamp	
Plate voltage, peak inverse	700	volts
Plate supply voltage, rms	235	volts
Plate current, peak steady state	600	ma
Output current, d-c		
With panel lamp but no shunting resistor	60	ma
With panel lamp and a shunting resistor	90	ma
Without panel lamp	100	ma
Panel lamp voltage, rms		
When panel lamp fails	15	volts
Panel lamp shunting resistor		
For d-c output current of 70 ma	800	ohms
For d-c output current of 80 ma	400	ohms
For d-c output current of 90 ma	250	ohms

CHARACTERISTICS

Tube Voltage Drop

Conducting 200 ma at plate	18	volts

TYPICAL OPERATION

Capacitor Input Filter with No. 40 or No. 47 Panel Lamp

Heater voltage (pin 2 to pin 7)	32	32	32	32		volts
Heater tap voltage (pin 2 to pin 3)	5.5	5.5	5.5	5.5		volts
Heater current (between pins 3 and 7)	150	150	150	150		ma
Plate supply voltage, rms	117	117	117	117	235	volts
Filter input capacitor	40	40	40	40	40	μf
Plate supply impedance	15	15	15	15	100	ohms
Panel lamp shunting resistor		300	150	100		ohms
Output current, d-c	60	70	80	90	60	ma

Capacitor Input without Panel Lamp†

Heater voltage (pin 2 to pin 7)	35	35	volts
Heater tap voltage (pin 2 to pin 3)	7.5	7.5	volts
Heater current (between pin 3 and 7)	150	150	ma
Plate supply voltage, rms	117	235	volts
Filter input capacitor	40	40	μf
Plate supply impedance	15	100	ohms
Output voltage at filter input, d-c			
At half-load current of 50 ma	140	280	volts
At full-load current of 100 ma	120	235	volts
Difference in voltage regulation	20	45	volts
Percentage regulation	14	16	%
Output current, d-c	100	100	ma

MAXIMUM CIRCUIT VALUES

Panel lamp shunting resistor†		
For d-c output current of 70 ma	800	ohms
For d-c output current of 80 ma	400	ohms
For d-c output current of 90 ma	250	ohms

NOTES:

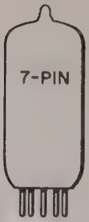
†Required when d-c output current exceeds 60 ma.

*Plate current must not flow through tap section.

35Z6GT • 36 • 37 • 38 • 39/44 • 40 40Z5/45Z5GT • 41 • 42 • 43 • 44 45 • 45A • 45Z3 • 46 • 47 • 48 • 49 50 • 50A5 • 50AX6G

(See chart for seldom-used tubes)

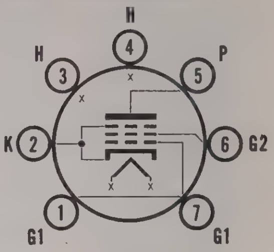
50B5



Beam power amplifier for a-c/d-c radio receivers

HEATER CHARACTERISTICS

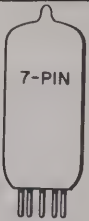
Voltage, a-c or d-c............	50	volts
Current.....................	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode.	90	volts



7BZ

Type 50B5 is identical to type 50C5 except for basing, and to type 12C5 except for basing and heater characteristics. See type 12C5 for ratings and characteristics.

50C5

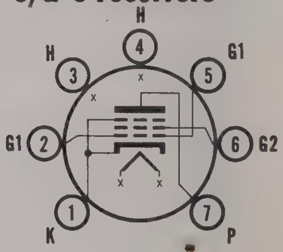


Audio power output amplifier in a-c/d-c receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c............	50	volts
Current.....................	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode................	200	volts
Heater positive to cathode★...............	200	volts

★D-c component must not exceed 100 volts max.



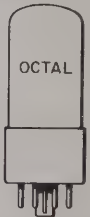
7CV

Type 50C5 is identical to type 12C5 and 25C5 except for heater characteristics and capacitances. See type 12C5 for ratings and characteristics.

50C6G

(See chart for seldom-used tubes)

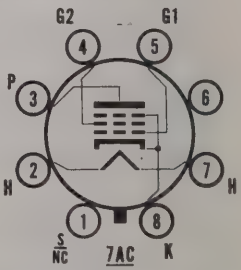
50L6GT



Beam power amplifier for a-c/d-c radio receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c..........	50.0	volts
Current......................	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode.	90	volts

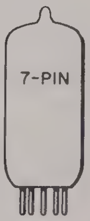


Type 50L6GT is identical to types 12L6GT and 25L6GT except for heater characteristics. See type 12L6GT for ratings and characteristics.

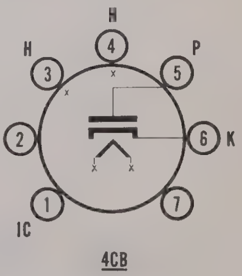
50X6 • 50Y6G • 50Y7GT
50Z7GT • 51 • 51S • 52 • 53 • 55
55S • 56 • 56AS • 57 • 57AS • 58
58AS • 59 • 64 • 64A • 65 • 65A • 67
67A • 68 • 68A • 70A7GT • 70L7GT
71 • 71A • 71B • 75 • 76 • 78 • 79 • 80
81 • 82V • 84/6Z4 • 85 • 85AS • 88
89 • 89Y • 95 • 96 • 117L7GT
117N7GT • 117P7GT
117Z4GT

(See chart for seldom-used tubes)

CBS 117Z3



Half-wave power rectifier used in 3-way portable radio receivers



HEATER CHARACTERISTICS

Voltage, a-c or d-c	117	volts
Current	.04	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	175	volts
Heater positive to cathode	100	volts

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Rectifier Service

Plate voltage, peak inverse	330	volts
Plate current, peak steady state	.54	amp
Plate current, peak transient	1.8	amp

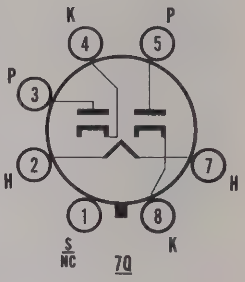
YPICAL OPERATION

Half-Wave Rectifier

Plate supply voltage, rms	117	volts
Output current, d-c	90	ma

CBS 117Z6GT

Full-wave voltage doubler with power-line voltage heater rating



HEATER CHARACTERISTICS

Voltage, a-c or d-c	117	volts
Current	.075	amp
Peak heater-cathode voltage, max.	350	volts

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)
Rectifier or Doubler Service

Plate voltage, peak inverse	700	volts
Output current, d-c	.60	amp
Plate current, peak steady state (each plate)	.36	amp

TYPICAL OPERATION
Half-Wave Rectifier (Capacitor Input Filter)*

Plate supply voltage, rms (each plate)	117	150	235	volts
Plate supply resistance (each plate)	15	40	100	ohms
Filter input capacitor	40	40	40	µf
Output current, d-c	60	60	60	ma

TYPICAL OPERATION

Voltage Doubler	Half-Wave	Full-Wave	
Plate supply voltage, rms	117	117	volts
Filter input capacitor	40	40	µf
Output current, d-c	60	60	ma
Plate supply resistance (each plate)	30	15	ohms

NOTES:

*In half-wave rectifier service, the two units may be used separately or in parallel.

182B/482B • 183/483 • 210T
401 • 484 • 950 • 951 • 5642
9002 • 9003 • 9006

(See chart for seldom-used tubes)

CBS

SELDOM-USED TUBES

Tube types rarely encountered by the technician. These data are given to aid in identification and replacement or substitution.

Table I	Diodes
Table II	Detector-Amplifiers or Rectifier-Amplifiers
Table III	General Purpose Triodes
Table IV	Voltage Amplifiers
Table V	Converters and Mixers
Table VI	Audio Power Amplifiers
Table VII	TV Deflection Power Amplifiers
Table VIII	Indicators (tuning eye)

TYPE	TABLE	TYPE	TABLE	TYPE	TABLE	TYPE	TABLE
00	III	1H5GT	II	2S/4S	I	6AF6G	VIII
00A	III	1H6G/GT	II	2V2	I	6AG6G	VI
01	III	1J5G	VI	2V3G	I	6AH5G	VI
01A	III	1J6G/GT	VI	2W3/GT	I	6AH7GT	III
01AA	III	1L6	V	2Z2/G84	I	6AJ4	III
01B	III	1LA4/E	VI	3A5	III	6AJ5	IV
1A3	I	1LA6	V	3A8GT	II	6AJ7	IV
1A4P	IV	1LB4	VI	3B7/1291	VI	6AK7	VI
1A4T	IV	1LB6	V	3C6	III	6AN4	III
1A5G/GT	VI	1LC5	IV	3D6	VI	6AN5	VI
1A6	V	1LC6	V	3E5	VI	6AN6	I
1AB5	IV	1LD5	II	3E6	IV	6AQ7GT	II
1AF4	IV	1LE3	III	3LE4	VI	6AR6	VI
1AF5	II	1LF3	III	3LF4	VI	6AS6	IV
1B4/951	IV	1LG5	IV	5AU4	I	6AS7G	III
1B4P	IV	1LH4	II	5AX4GT	I	6AX6G	I
1B4T	IV	1LN5	IV	5AZ4	I	6B4G	VI
1B5/25S	II	1N5GT	IV	5T4	I	6B5	VI
1B6	IV	1N6G	II	5W4/G/GT	I	6B6G	II
1B7G/GT	V	1P5G/GT	IV	5X3	I	6B7	II
1B8GT	II	1Q5GT/G	VI	5X4G	I	6B8/G/GT	II
1C5G/GT	VI	1Q6	II	5Z4	I	6BA7	V
1C6	V	1R4	I	6A3	VI	6BD5GT	VII
1C7G	V	1S4	VI	6A4	VI	6BD7	II
1C8	V	1SA6GT	IV	6A5G	VI	6BF7	III
1D5GP/GT	IV	1SB6GT	II	6A6	VI	6BG7	III
1D7G	V	1T5GT	VI	6A7	V	6BK6	II
1D8GT	II	1U6	V	6A8/G/GT	V	6BN7	VII
1E4/G	III	1V	I	6AB5/6N5	VIII	6BU5	IV
1E5GP	IV	1W4	VI	6AB6G	VI	6BY5G	I
1E5G/GT	IV	2A3	VI	6AB7/1853	IV	6C6	IV
1E7G/GT	VI	2A3H	VI	6AC5G/GT	VI	6C7	II
1F4	VI	2A5	VI	6AC6GT	VI	6C8G	III
1F5G	VI	2A6	II	6AD5G/GT	III	6D5G	VI
1F6	II	2A7	V	6AD6G	VIII	6D6	IV
1F7G/GH/GV	II	2A7S	V	6AD7G	VI	6D7	IV
1G4G/GT	III	2B7	II	6AE5GT	III	6D8/G	V
1G5G/GT	VI	2B7S	II	6AE6G	III	6DB6	IV
1G6G/GT	VI	2E5	VIII	6AE7G/GT	III	6E5	VIII
1H4G/GT	III	2G5	VIII	6AF5G	III	6E6	VI

CBS ELECTRON TUBES

SELDOM-USED TUBES (cont.)

TYPE	TABLE
6E7	IV
6F4	III
6F5/G/GT	III
6F6G/GT	VI
6F7/S	II
6F8G	III
6G5/6H5	VIII
6G6G	VI
6H4	I
6H4GT	I
6H5	VIII
6J4	III
6J7G/GT	IV
6J8G	V
6K4	III
6K5G/GT	III
6L5G	III
6N4	III
6N6G	VI
6P5GT	III
6P7G	II
6Q6/G	II
6Q7/G/GT	II
6R6G	IV
6R7/G/GT	II
6R8	II
6S7G	IV
6SB7Y	V
6SC5	III
6SD7GT	IV
6SE7GT	IV
6SF5/GT	III
6SF7	II
6SR7GT	II
6SS7	IV
6ST7	II
6SU7GTY	III
6SV7	II
6SZ7	II
6T5	VIII
6T6	II
6T7G/6Q6G	II
6U4GT	I
6U5	VIII
6U6GT	VI
6U7G	IV
6V5G/GT	VI
6V7G	II
6V8	II
6W5G	I
6W7G	IV
6X5GT	I
6Y3G	I
6Y5/V	I
6Y7G	VI
6Z3	I
6Z4	I
6Z4/84	I
6Z5/12Z5	I
6Z7G	VI
6ZY5G	I
7A4	III
7A5	VI
7A6	I
7A7	IV
7A8	V
7AB7	IV
7AD7	IV
7AF7	III
7AG7	IV
7AH7	IV
7AJ7	IV
7B4	III
7B5	VI
7B6	II
7B7	IV
7B8	V
7C4	I
7C5	VI
7C6	II
7C7	IV
7E5	III
7E6	II
7E7	II
7F7	III
7F8	III
7G7	IV
7G8	IV
7H7	IV
7J7	V
7K7	II
7L7	IV
7N7	III
7Q7	V
7R7	II
7S7	V
7T7	IV
7V7	IV
7W7	IV
7Y4	I
7X6	I
7X7	II
7Z4	I
10	VI
11	III
12	III
12A/112A	VI
12A4	VII
12A5	VI
12A6/GT	VI
12A7	VI
12A8GT	V
12AH6	IV
12AH7GT	III
12AW6	IV
12AY7	III
12B7	IV
12B8GT	II
12BA7	V
12C8	II
12CS5	VI
12CS6	IV
12F5GT	III
12G4	III
12H4	III
12H6	I
12J7G/GT	IV
12K7G/GT	IV
12K8/GT	V
12L8GT	VI
12Q7G/GT	II
12S8	II
12SC7	III
12SF5/GT	III
12SF7	II
12SH7	IV
12SJ7/GT	IV
12SL7GT	III
12SR7	II
12Z3	I
12Z5	I
13	I
14A4	III
14A5	VI
14A7	IV
14AF7	III
14B6	II
14B8	V
14C5	VI
14C7	IV
14E6	II
14E7	II
14F7	III
14F8	III
14H7	IV
14J7	V
14N7	III
14Q7	V
14R7	II
14S7	V
14W7	IV
14X7	II
14Y4	I
14Z3	I
15	IV
16	I
16B	I
18	VI
19	VI
19C8	II
19V8	II
19X8	V
20	VI
22	IV
24A	IV
25	II
25A6/G/GT	VI
25A7GT	VI
25AC5GT	VI
25B5	VI
25B6G	VI
25B8	II
25C6G	VI
25D8GT	II
25N6	VI
25W6/GT	VI
25Y5	I
25Z5	I
26	III
26A6	IV
26A7	VI
26C6	II
26D6	V
27	III
28Z5	I
30	III
31	VI
32	IV
32L7GT	VI
33	VI
34	IV
35/51	IV
35A5	VI
35Y4	I
35Z3	I
35Z6G	I
36	IV
37	III
38	VI
39/44	IV
40	III
40Z5/45Z5GT	I
41	VI
42	VI
43	VI
44	IV
45	VI
45A	VI
45Z3	I
46	VI
47	VI
48	VI
49	VI
50	VI
50A5	VI
50AX6G	I
50C6G	VI
50X6	I
50Y6GT	I
50Y7GT	I
50Z7GT	I
51	IV
51S	IV
52	VI
53	VI
55	II
55S	II
56	III
56AS	III
57	IV
57AS	IV
58	IV
58AS	IV
59	VI
64	IV
64A	IV
65	IV
65A	IV
67	III
67A	III
68	VI
68A	VI
70A7GT	VI
70L7GT	VI
71	VI
71A	VI
71B	VI
75	II
76	III
77	IV
78	IV
79	VI
80	I
81	I
82	I
82V	I
84/6Z4	I
85	II
85AS	II
88	I
89/89Y	VI
95	VI
96	I
117L7/M7GT	VI
117N7GT	VI
117P7GT	VI
117Z4GT	I
182B/482B	VI
183/483	VI
210T	VI
401	III
484	III
950	VI
951	IV
5642	I
9002	III
9003	IV
9006	I

TABLE I. CBS DIODES

	DESCRIPTION		CONSTRUCTION		CATHODE			MAX. RATINGS		SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION							
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PEAK INVERSE VOLTS	PEAK PLATE MA	APPLICATION	PLATE SUPPLY VOLTS, RMS (EACH PLATE)	MIN PLATE-SUPPLY IMPEDANCE, Ω	INPUT CAPACITOR, µf	MIN. INPUT CHOKE, H	VOLTAGE DROP EACH SECTION (V. at MA.)	OUTPUT VOLTAGE AT FILTER INPUT	D-C OUTPUT, MA	TYPE
1A3	S	1R4	5AP	Min.-7	Fil.	1.4	0.15	330	5.0	HF Detector & Rectifier	117	0	2.0	—	—	—	0.5	**1A3**
1R4	S	1A3	4AH	Loctal	Fil.	1.4	0.15	—	—	HF Detector & Rectifier	117	—	—	—	8 at 2.0	—	1	**1R4**
1V	S	6Z3	4G	Small-4	Htr.	6.3	0.3	1000	270.0	Half-Wave Rectifier	117 150 325	0 30 75	— — —	— — —	20 at 90.0 — —	— — —	45 45 45	**1V**
2S/4S	D		5D	Small-5	Htr.	2.5	1.35	—	—	Detector	50	Approx. 40 ma per plate				—	50	**2S/4S**
2V2	S		8FV	Octal	Fil.	2.5 1.25	0.2 0.4	15,000 21,000 30,000	80.0 80.0 —	High Voltage Rectifier	— — —	— — —	— — —	— — —	— — 150 at 7.0	— — —	2.0 1.0 0.2	**2V2**
2V3G	S		4Y	Octal	Fil.	2.5	5.0	16,500	12.0	H-W Rectifier	6000	—	—	—	—	—	2.0	**2V3G**
2W3, GT	S	2Z2/G84	4X	Octal	Fil.	2.5	1.50	—	—	H-W Rectifier	350	Capacitor input to filter					55	**2W3, GT**
2Z2/G84	S	2W3GT	4B	Medium-4	Fil.	2.5	1.50	—	—	H-W Rectifier	350	—	—	—	—	—	50	**2Z2/G84**

TABLE I. (continued) Diodes

	DESCRIPTION		CONSTRUCTION		CATHODE			MAX. RATINGS		SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION							
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PEAK INVERSE VOLTS	PEAK PLATE MA	APPLICATION	PLATE SUPPLY VOLTS, RMS (EACH PLATE)	MIN PLATE-SUPPLY IMPEDANCE, Ω	INPUT CAPACITOR, μf	MIN. INPUT CHOKE, H	VOLTAGE DROP EACH SECTION (V. at MA.)	OUTPUT VOLTAGE AT FILTER INPUT	D-C OUTPUT, MA	TYPE
5AU4	D		5T	Octal	Fil.	5.0	4.5	1400	1075	F-W Power Rectifier	300 400 500	30 50 —	40 40 —	— — 10	50 at 350 — —	275 395 395	350 325 325	**5AU4**
5AX4GT	D		5T	Octal	Fil.	5.0	2.5	1400	525	F-W Power Rectifier	350 500	50 —	10 —	— 10	— —	330 375	175 175	**5AX4GT**
5AZ4	D	5Y3GT	5T	Loctal	Fil.	5.0	2.0	1400	400	F-W Power Rectifier	350 500	50 —	20 —	— 10	60 at 125 60 at 125	360 380	125 125	**5AZ4**
5T4	D	5U4GB	5T	Octal	Fil.	5.0	2.0	1550	675	F-W Power Rectifier	450 550	150 —	— —	— 3	— —	— —	225 225	**5T4**
5W4, G, GT	D	5Y4GT	5T	Octal	Fil.	5.0	1.5	1400	300	F-W Power Rectifier	350 500	> 25 —	— —	— 6	45 at 100 45 at 100	— —	100 100	**5W4, G, GT**
5X3	D		4C	Medium-4	Fil.	5.0	2.0	—	—	F-W Power Rectifier	400 1275	Choke or Capacitor input to filter Choke or Capacitor input to filter					110 30	**5X3**
5X4G	D	5U4GB	5Q	Octal	Fil.	5.0	3.0	1550	675	F-W Power Rectifier	450 550	75 —	40 —	— 3	— 58 at 225	— —	225 225	**5X4G**

5Z4	D		5L	Octal	Htr.	5.0	2.0	1400	375	F-W Power Rectifier	350 500	30 —	40 —	— 5	— 20 at 125	— —	125 125	**5Z4**
6AN6	Q		7BJ	Min.-7	Htr.	6.3	0.2	210	45	Detector	75	—	—	—	9 at 6.6	—	3.3	**6AN6**
6AX6G	D		7Q	Octal	Htr.	6.3	2.5	1250 2000	600 600	F-W Rectifier Damper	350 350	145 —	40 —	— —	21 at 250 —	350 —	250 —	**6AX6G**
6BY5G	D		6CN	Octal	Htr.	6.3	1.6	1400 2500	525 525	Rectifier Damper	375 —	100 —	8.0 —	— —	32 at 175 —	380 —	175 —	**6BY5G**
6H4, GT	S	6H6GT	5AF	Octal	Htr.	6.3	0.15	—	—	Detector	100	—	—	—	—	—	4.0	**6H4, GT**
6U4GT	D	6W4GT	4CG	Octal	Htr.	6.3	1.2	1375	660	H-W Rectifier	350	145	20	—	21 at 250	335	125	**6U4GT**
6W5G	D	6X6G	6S	Octal	Htr.	6.3	0.9	—	—	F-W Rectifier	325 450	Capacitor input to filter Choke input to filter					90 90	**6W5G**
6X5GT	D	6Y5/V	6S	Octal	Htr.	6.3	0.6	1250	210	F-W Power Rectifier	325 450	150 —	40 —	— 10	— 22 at 70	— —	70 70	**6X5GT**
6Y3G	S		4AC	Octal	Htr.	6.3	0.7	14,000	100	H-W Rectifier	5000	Choke or Capacitor input to filter					7.5	**6Y3G**
6Y5/V	D	6X5GT	6J	Small-6	Htr.	6.3	0.8	1500	—	F-W Rectifier	350	Capacitor input to filter					50	**6Y5/V**
6Z3	S	1V	4G	Small-4	Htr.	6.3	0.3	—	—	Same as 1V								**6Z3**
6Z4, 6Z4/84	D	6X5GT	5D	Small-5	Htr.	6.3	0.5	— 1250	— 180	F-W Power Rectifier	325 450	Capacitor input to filter Choke input to filter					60 60	**6Z4, 6Z4/84**
6Z5/12Z5	D		6K	Small-6	Htr.	6.3	0.8	—	—	F-W Power Rectifier	230	Capacitor input to filter					60	**6Z5/12Z5**

★S=Single diode. D=Duodiode. T=Triple diode. Q=Quadruple diode.

TABLE I. (continued) Diodes

	DESCRIPTION			CONSTRUCTION		CATHODE		MAX. RATINGS		SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION							
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PEAK INVERSE VOLTS	PEAK PLATE MA	APPLICATION	PLATE SUPPLY VOLTS, RMS (EACH PLATE)	MIN PLATE-SUPPLY IMPEDANCE, Ω	INPUT CAPACITOR, μf	MIN. INPUT CHOKE, H	VOLTAGE DROP EACH SECTION (V. at MA.)	OUTPUT VOLTAGE AT FILTER INPUT	D-C OUTPUT, MA	TYPE
6ZY5G	D	6Y5/V	6S	Octal	Htr.	6.3	0.3	1250	120	F-W Power Rectifier	325 450	225 —	Capacitor input to filter —	13.5	—	—	40 40	**6ZY5G**
7A6	D	6H6GT	7AJ	Loctal	Htr.	6.3	0.15	420	48	Detector & H-W Rectifier	117 150	15 40	— —	— —	11 at 16 11 at 16	— —	8 8	**7A6**
7C4	S	9006	4AH	Loctal	Htr.	6.3	0.15	—	—	Detector & H-W Rectifier	117	Resonant Frequency = 900 Mc				—	5	**7C4**
7X6	D		7AJ	Loctal	Htr.	6.3	1.2	700	450	H-W Rectifier Doubler	235 H-W117 F-W117	100 30 15	16 16 16	— — —	— 22 at 150	— — —	75 75 75	**7X6**
7Y4	D	6X5GT	5AB	Loctal	Htr.	6.3	0.5	1250	210	F-W Power Rectifier	325 450	150 —	40 —	— 10	22 at 70 22 at 70	— —	70 70	**7Y4**
7Z4	D	6X5GT	5AB	Loctal	Htr.	6.3	0.9	1250	300	F-W Power Rectifier	325 450	75 —	40 —	— 6	40 at 100 40 at 100	— —	100 100	**7Z4**
12H6	D	12AL5	7Q	Octal	Htr.	12.6	0.15	150	—	Detector & H-W Rectifier	150	15	—	—	—	—	8	**12H6**

12Z3	S		4G	Small-4	Htr.	12.6	0.3	700	330	H-W Power Rectifier	117 150 235	0 30 75	Capacitor input to filter				55 55 55	**12Z3**
12Z5	D		6K	Octal	Htr.	12.6	0.3	—	—	Same as 6Z5/12Z5								**12Z5**
13	D		4C	Medium-4	Htr.	5.0	2.0	1400	440	F-W Power Rectifier	350 500	50 —	20 —	— 10	50 at 125 50 at 125	360 380	125 125	**13**
14Y4	D		5AB	Loctal	Htr.	12.6	0.3	—	—	Same as 7Y4								**14Y4**
14Z3	S		4G	Small-4	Htr.	12.6	0.3	—	—	—	250	—	—	—	—	—	60	**14Z3**
16, 16B	S	81	4B	Small-4	Htr.	7.5	1.25	2000	500	H-W Power Rectifier	700	—	—	—	—	—	85	**16, 16B**
25Y5	D	25Z5 25Z6GT	6E	Small-6	Htr.	25.0	0.3	700	—	H-W Rectifier Doubler	235	—	—	—	—	—	75	**25Y5**
25Z5	D	25Z6	6E	Small-6	Htr.	25.0	0.3	700	450	H-W Rectifier Doubler	235 H-W 117 F-W 117	100 30 15	16 16 16	— — —	22 at 150 — —	— — —	75 75 75	**25Z5**
28Z5	D		6BJ	Loctal	Htr.	28.0	0.24	—	—	F-W Power Rectifier	325 450	Capacitor input to filter Choke input to filter		6.0	—	—	100 100	**28Z5**
35Y4	S	35Z5GT 40Z5/45Z5GT	5AL	Loctal	Htr.	35.0	0.15	700	600	H-W Power Rectifier	235 235 117	100 100 15	40 40 40	With panel lamp — —	— 18 at 200	— 235 120	60 100 100	**35Y4**
35Z3	S	35W4, 35Y4 35Z4, 35Z5GT	4Z	Loctal	Htr.	35.0	0.15	700	600	H-W Power Rectifier	117 235	15 100	40 40	— —	— 18 at 200	120 235	100 100	**35Z3**

★S = Single diode. D = Duodiode. T = Triple diode.

TABLE I. (continued) Diodes

	DESCRIPTION		CONSTRUCTION		CATHODE			MAX. RATINGS		SERVICE		AVERAGE CHARACTERISTICS AND TYPICAL OPERATION						
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PEAK INVERSE VOLTS	PEAK PLATE MA	APPLICATION	PLATE SUPPLY VOLTS, RMS (EACH PLATE)	MIN PLATE-SUPPLY IMPEDANCE, Ω	INPUT CAPACITOR, µf	MIN. INPUT CHOKE, H	VOLTAGE DROP EACH SECTION (V. at MA.)	OUTPUT VOLTAGE AT FILTER INPUT	D-C OUTPUT, MA	TYPE
35Z6GT	D		7Q	Octal	Htr.	35.0	0.3	—	—	H-W Rectifier Doubler	117 235	— —	— —	— —	— —	— —	110 110	**35Z6GT**
40Z5/45Z5GT	S	35Z5GT	6AD	Octal	Htr.	45.0	0.15	—				Same as 35Y4						**40Z5/45Z5GT**
45Z3	S		5AM	Min.-7	Htr.	45.0	0.075	350	390	H-W Rectifier	117	15	40	—	23 at 130	—	65	**45Z3**
50AX6G	D		7Q	Octal	Htr.	50.0	0.3	1250 2000	600 600	F-W Rectifier Damper	350 —	145 —	40 —	— —	21 at 250 —	— —	250 —	**50AX6G**
50X6	D	50Y7GT 50Z7GT	7AJ	Loctal	Htr.	50.0	0.15	700	450	H-W Rectifier Doubler	235 H-W 117 F-W 117	100 30 15	16 16 16	— — —	— 22 at 150	— — —	75 75 75	**50X6**
50Y6GT	D	50Z7GT	7Q	Octal	Htr.	50.0	0.15	700	450	H-W Rectifier Doubler	235 H-W 117 F-W 117	100 30 15	40 40 40	— — —	— — 22 at 150	— — —	75 75 75	**50Y6GT**
50Y7GT	D	50Y6GT	8AN	Octal	Htr.	50.0	0.15	235 117	450 450	H-W Rectifier Doubler	150 235 117	40 100 15	40 40 40	— —	22 at 150 — Lamp shunt = 250 Ω	— —	65 65 65	**50Y7GT**

50Z7GT	D	50Y6GT	8AN	Octal	Htr.	50.0	0.15	—	—	H-W Rectifier Doubler	235 117	100 15	40 40	—	22 at 150 Lamp shunt = 250 Ω	—	65 65	**50Z7GT**
80	D	5Y3GT	4C	Medium-4	Fil.	5.0	2.0	1400	400	F-W Rectifier	350 500	50 —	10 —	— 10	60 at 125 60 at 125	350 390	125 125	**80**
81	S		4B	Medium-4	Fil.	7.5	1.25	2000	500	H-W Rectifier	700	—	4	20	—	—	85	**81**
82/82V	D		4C	Medium-4	Fil.	2.5	3.0	1550	600	F-W Mercury Rectifier	450 550	50 —	40 —	— 6	15 at 115 —	— —	115 115	**82/82V**
84/6Z4	D		5D	Small-5	Htr.	6.3	0.5	1250	180	F-W Power Rectifier	325 450	65 —	40 —	— 10	20 at 60 —	— —	60 60	**846/Z4**
88	D		4C	Medium-4	Fil.	5.0	2.0	—	—	F-W Power Rectifier	450	—	—	—	—	—	125	**88**
96	S		4G	Small-4	Htr.	10.0	0.5	—	—	H-W Power Rectifier	350	—	—	—	—	—	100	**96**
117Z4GT	S	117Z6GT	5AA	Octal	Htr.	117.0	0.04	350	540	H-W Rectifier	117	30	C input	—	22 at 180	—	90	**117Z4GT**
5642	S		5642	Submin.-2	Fil.	1.25	0.2	10,000	12	TV High V. Rectifier	3600	—	—	—	—	—	2	**5642**
9006	S		6BH	Min.-7	Htr.	6.3	0.15	750	15	UHF Detector	270	100	—	—	—	—	5	**9006**

★S=Single diode. D=Duodiode. T=Triple diode.

TABLE II. CBS DETECTOR AMPLIFIERS (Diode and Triode, Tetrode, or Pentode Combined)

	DESCRIPTION			CONSTR.		CATHODE		MAX RATINGS		SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION									
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID VOLTS	PLATE RESISTANCE	TRANSCONDUCTANCE µMHOS	AMP. FACTOR	PLATE MA	SCREEN MA	DIODE MA AT APPLIED VOLTS	TYPE
1AF5	D+P	1S5	6AU	Min.-7	Fil.	1.4	0.025	110	110	A-F Class A	67.5 90	67.5 90	0 0	230K 200K	550 600	— —	0.7 1.1	0.25 0.4	0.7 at 10 0.7 at 10	**1AF5**
1B5/25S	D+D+T	1H6GT	6M	Small-6	Fil.	2.0	0.06	—	—	A-F Class A	135	—	—3.0	35K	575	20	0.8	—	—	**1B5/25S**
1B8GT	D+T+P	1D8GT	8AJ	Octal	Fil.	1.4	0.10	—	—	Triode Class A Pentode Class A	90 90	— 90	0 —6.0	240K R_L=14K	275 1150	— P_o=.21W	0.15 6.3	— 1.4	— —	**1B8GT**
1D8GT	D+T+P	1B8GT	8AJ	Octal	Fil.	1.4	0.10	—	—	Triode Class A Pentode Class A	90 90	— 90	0 —9.0	43.5K 200K	575 925	25 —	1.1 5.0	— 1.0	— —	**1D8GT**
1F6	D+D+P	1F7G	6W	Small-6	Fil.	2.0	0.06	—	—	R-F Class A A-F Class A	180 135	67.5 135	—1.5 —1.0	1000K 250K	650 R_{g2}=1.0 meg	650 VG=48	2.0 .42	0.6 —	— —	**1F6**
1F7G, H, V	D+D+P	1F6	7AD 7AF	Octal	Fil.	2.0	0.06	Same as 1F6												**1F7G, H, V**
1H5GT	D+T	1LH4	5Z	Octal	Fil.	1.4	0.05	110	—	A-F Class A	90	R_g=1.0 meg	0	240K	275	65	0.15	—	0.5 at 10	**1H5GT**

1H6G, GT	D+D+T	1B5/25S	7AA	Octal	Fil.	2.0	0.06	—	—	A-F Class A	135	—	—3	35K	575	20	0.8	—	—	**1H6G, GT**
1LD5	D+P		6AX	Loctal	Fil.	1.4	0.05	110	50	A-F Class A	45 90	45 45	0 0	900K 450K	550 575	— —	0.55 0.6	0.12 0.1	0.5 at 10 0.5 at 10	**1LD5**
1LH4	D+T	1H5GT	5AG	Loctal	Fil.	2.0	0.06	Same as 1H5GT												**1LH4**
1N6G	D+P		7AM	Octal	Fil.	1.4	0.05	—	—	Power Class A	90	90	—4.5	R_L=25K	800	P_o=.1W	3.1	0.6	—	**1N6G**
1Q6	D+P		8CO	Sub-min.-8	Fil.	1.25	0.04	—	—	A-F Class A	30 67.5	30 67.5	0 0	500K 400K	330 600	— —	0.33 1.6	0.09 0.4	— —	**1Q6**
1SB6GT	D+P	1LD5	6BE	Octal	Fil.	1.4	0.05	—	—	A-F Class A	45 90	45 67.5	0 0	900K 700K	500 665	— —	0.6 1.45	0.16 0.38	— —	**1SB6GT**
2A6	D+D+T		6G	Small-6	Htr.	2.5	0.8	250	—	A-F Class A	250	—	—2.0	91K	1100	100	0.9	—	0.8 at 10	**2A6**
2B7, S	D+D+P		7D	Small-7	Htr. Htr.	2.5 2.5	0.8 0.8	300	125	A-F Class A	250 250	125 100	—3.0 —3.0	650K 800K	1125 1000	730 800	9.0 6.0	2.3 1.5	0.8 at 10	**2B7, S**
3A8GT	D+T+P		8AS	Octal	Htr.	1.4 2.8	0.1 .05	110 110	— 110	Triode Class A Pentode Class A	90 90	— 90	0 0	200K 800K	325 750	65 —	0.2 1.5	— 0.5	0.5 at 10 —	**3A8GT**
6AQ7GT	D+D+T		8CK	Octal	Htr.	6.3	0.5	250	—	A-F Class A	250	—	—2	44K	1600	70	2.3	—	—	**6AQ7GT**
6B6G	D+D+T	6Q7GT	7V	Octal	Htr.	6.3	0.3	Same as 2A6												**6B6G**
6B7	D+D+P	6B8GT	7D	Small-7	Htr.	6.3	0.30	300	125	A-F Class A	100 250	100 125	—3.0 —3.0	300K 600K	950 1125	— —	5.8 9.0	1.7 2.3	0.8 at 10 —	**6B7**

★Class Code:
D+P=Diode-pentode.
D+T+P=Diode-triode-pentode.
D+T=Diode-triode.
D+D+T=Duodiode-triode.
D+D+P=Duodiode-pentode.
T+P=Triode-pentode.

TABLE II. (continued) Detector Amplifiers

	DESCRIPTION			CONSTR.		CATHODE		MAX. RATINGS		SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION								
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID VOLTS	PLATE RESISTANCE	TRANSCONDUCTANCE µmhos	AMP. FACTOR	PLATE MA	SCREEN MA	DIODE MA AT APPLIED VOLTS	TYPE
6B8, G, GT	D+D+P	6B7	8E	Octal	Htr.	6.3	0.30	300 300	125 —	A-F Class A	250 250	125 125	—3.0 —3.0	600K 600K	1125 1325	— —	9.0 10.0	2.3 2.3	0.8 at 10 —	**6B8, G, GT**
6BD7	D+D+T		9Z	Min.-9	Htr.	6.3	0.23	—	—	A-F Class A	250	—	—3.0	58K	1200	70	1.0	—	—	**6BD7**
6BK6	D+D+T		7BT	Min.-7	Htr.	6.3	0.3	300	—	A-F Class A	100 250	— —	—1.0 —2.0	80K 62.5K	1250 1600	100 100	0.5 1.2	— —	— —	**6BK6**
6C7	D+D+T	6SR7GT	7G	Small-7	Htr.	6.3	0.3	—	—	A-F Class A	250	—	—9.0	16K	—	20	4.5	—	—	**6C7**
6F7, S	T+P	6P7G	7E	Small-7	Htr.	6.3	0.3	—	—	Triode Class A Pentode Class A	100 250	— 100	—3.0 —3.0	16K 850K	500 1100	8.5 900	3.5 6.5	— 1.5	— —	**6F7, S**
6P7G	T+P	6F7	7U	Octal	Htr.	6.3	0.3	Same as 6F7												**6P7G**
6Q6, G	D+T		6Y	Octal	Htr.	6.3	0.15	—	—	A-F Class A	250	—	—3.0	61K	1050	65	1.2	—	—	**6Q6, G**
6Q7, G, GT	D+D+T		7V	Octal	Htr.	6.3	0.3	300	—	A-F Class A	100 250	— —	—1.0 —3.0	58K 58K	1200 1200	70 70	0.8 1.0	— —	0.8 at 10	**6Q7, G, GT**

6R7, G, GT	D+D+T	6SR7GT	7V	Octal	Htr.	6.3	0.3	250	—	A-F Class A	250	—	−9.0	8.5K	1900	16	9.5	—	—	**6R7, G, GT**
6R8	D+D+D+T		9E	Min.-9	Htr.	6.3	0.45	250 R_{g1} =1 meg	—	A-F Class A	250	—	−9.0	8.5K	1900	16	9.5	R_a = 10000Ω	—	**6R8**
6SF7	D+P	6SV7	7AZ	Octal	Htr.	6.3	0.3	300	100	A-F Class A	100 250	100 100	−1.0 −1.0	200K 700K	1975 2050	— —	12.0 12.4	3.4 3.3	— —	**6SF7**
6SR7GT	D+D+T	6R7GT	8Q	Octal	Htr.	6.3	0.3	250	—	A-F Class A	250	—	−9.0	8.5K	1900	16	9.5	—	—	**6SR7GT**
6ST7	D+D+T	6T7G	8Q	Octal	Htr.	6.3	0.15	Same as 6SR7GT												**6ST7**
6SV7	D+P		7AZ	Octal	Htr.	6.3	0.3	300	150	A-F Class A	100 250	100 150	−1.0 −1.0	700K 1500K	2600 3600	— —	3.7 7.5	1.4 2.8	15 at 10 15 at 10	**6SV7**
6SZ7	D+D+T	6SQ7GT	8Q	Octal	Htr.	6.3	0.15	—	—	A-F Class A	100 250	— —	−1.0 −3.0	61K 58K	1150 1200	70 70	0.8 1.0	— —	— —	**6SZ7**
6T6	D+D+T		6Z	Octal	Htr.	6.3	0.45	—	—	A-F Class A	250	100	−1.0	1000K	5500	—	10.0	2.0	—	**6T6**
6T7G/6Q6G	D+D+T	6ST7	7V	Octal	Htr.	6.3	0.15	—	—	A-F Class A	100 250	— —	−1.5 −3.0	95K 62K	680 1050	65 65	0.3 1.2	— —	— —	**6T7G/6Q6G**
6V7G	D+D+T	85	7V	Octal	Htr.	6.3	0.3	—	—	A-F Class A	135 180 250	— — —	−10.5 −13.5 −20.0	11K 8.5K 7.5K	750 975 1100	8.3 8.3 8.3	3.7 6.0 8.0	— — —	— — —	**6V7G**

★Class Code:
D+P=Diode-pentode.
D+T+P=Diode-triode-pentode.
D+T=Diode-triode.
D+D+T=Duodiode-triode.
D+D+P=Duodiode-pentode.
T+P=Triode-pentode.

TABLE II. (continued) Detector Amplifiers

	DESCRIPTION		CONSTR.		CATHODE			MAX. RATINGS		SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION									
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID VOLTS	PLATE RESISTANCE	TRANSCONDUCTANCE µmhos	AMP. FACTOR	PLATE MA	SCREEN MA	DIODE MA AT APPLIED VOLTS	TYPE
6V8	D+D+D+T		9AH	Min.-9	Htr.	6.3	0.45	300	—	A-F Class A	100 250	— —	—1.0 —3.0	54K 58K	1300 1200	70 70	0.8 1.0	— —	D_2 & D_3 40 at 5 D_1 2 at 10	**6V8**
7B6	D+D+T	6B6G 6Q7GT	8W	Loctal	Htr.	6.3	0.3	300	—	A-F Class A	100 250	— —	—1.0 —2.0	110K 91K	900 1100	100 100	0.4 0.9	— —	2 at 10 —	**7B6**
7C6	D+D+T		8W	Loctal	Htr.	6.3	0.15	300	—	A-F Class A	100 250	— —	0 —1.0	100K 100K	850 1000	85 100	1.0 1.3	— —	2 at 10	**7C6**
7E6	D+D+T		8W	Loctal	Htr.	6.3	0.3	300	—	A-F Class A	100 250	— —	—3.0 —9.0	11K 8.5K	1500 1900	16.5 16.0	3.9 9.5	— —	0.8 at 10	**7E6**
7E7	D+D+P		8AE	Loctal	Htr.	6.3	0.3	300	100	R-F Class A	100 250	100 100	—1.0 —3.0	150K 700K	1600 1300	— —	10.0 7.5	2.7 1.6	— —	**7E7**
7K7	D+D+T		8BF	Loctal	Htr.	6.3	0.3	300	—	A-F Class A	250	—	—2.0	44K	1600	70	2.3	—	—	**7K7**
7R7	D+D+P		8AE	Loctal	Htr.	6.3	0.3	250	—	A-F Class A	100 250	100 100	—1.0 —1.0	350K 1000K	3000 3200	— —	5.5 5.7	2.2 2.1	2 at 10 —	**7R7**

7X7	D+D+T		8BZ	Loctal	Htr.	6.3	0.3	300	—	FM Detector A-F Class A	100 250	— —	0 —1.0	85K 67K	1000 1500	85 100	1.2 1.9	— —	1 at 5 —	**7X7**
12B8GT	T+P		8T	Octal	Htr.	12.6	0.3	—	—	Triode Class A Pentode Class A	90 90	— 90	0 —3.0	37K 200K	2400 1800	90 —	2.8 7.0	— 2.0	—	**12B8GT**
12C8	D+D+P		8E	Octal	Htr.	12.6	0.15	Same as 6B8												**12C8**
12Q7, G, GT	D+D+T	14B6	7V	Octal	Htr.	12.6	0.15	Same as 6Q7 ● 6Q7G ● 6Q7GT												**12Q7, G, GT**
12S8	D+D+D+T		8CB	Octal	Htr.	12.6	0.15	300	—	A-F Class A	100 250	— —	—1.0 —2.0	110K 91K	900 1100	100 100	0.4 0.9	— —	2.5 at 10 —	**12S8**
12SF7	D+P		7AZ	Octal	Htr.	12.6	0.015	—	Same as 6SF7											**12SF7**
12SR7	D+D+T		8Q	Octal	Htr.	12.6	0.15	—	Same as 6SR7GT											**12SR7**
14B6	D+D+T	12Q7GT	8W	Loctal	Htr.	12.6	0.15	—	Same as 7B6											**14B6**
14E6	D+D+T		8W	Loctal	Htr.	12.6	0.15	—	Same as 7E6											**14E6**
14E7	D+D+P		8AE	Loctal	Htr.	12.6	0.15	—	Same as 7E7											**14E7**
14R7	D+D+P		8AE	Loctal	Htr.	12.6	0.15	—	Same as 7R7											**14R7**
14X7	D+D+T		8BZ	Loctal	Htr.	12.6	0.15	—	Same as 7X7											**14X7**
19C8	D+D+D+T		9E	Min.-9	Htr.	18.9	0.15	—	—	A-F Class A	100	—	—1.0	80K	1250	100	0.5	—	—	**19C8**

★Class Code:

D+P=Diode-pentode.
D+T+P=Diode-triode-pentode.
D+T=Diode-triode.
D+D+T=Duodiode-triode.
D+D+P=Duodiode-pentode.
T+P=Triode-pentode.

TABLE II. (continued) Detector Amplifiers

	DESCRIPTION				CONST.		CATHODE			MAX. RATINGS	SERVICE		AVERAGE CHARACTERISTICS AND TYPICAL OPERATION							
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID VOLTS	PLATE RESISTANCE	TRANSCONDUCTANCE µmhos	AMP. FACTOR	PLATE MA	SCREEN MA	DIODE MA AT APPLIED VOLTS	TYPE
19V8	D+D+D+T		9AH	Min.-9	Htr.	18.9	0.15	—	—	A-F Class A	100 250	— —	—1.0 —3.0	54K 58K	1300 1200	70 70	0.8 1.0	— —	—	**19V8**
25	D+D+T		6M	Small-6	Fil.	2.0	0.06	—	Same as 1B5/25S											**25**
25B8	T+P		8T	Octal	Htr.	25.0	0.15	—	—	Triode Class A Pentode Class A	100 100	— 100	—1.0 —3.0	75K 185K	1500 2000	112.5 370	0.6 7.6	— 2.0	— —	**25B8**
25D8GT	D+T+P		8AF	Octal	Htr.	25.0	0.15	—	—	R-F Class A	100 100	— 100	—1.0 —3.0	91K 200K	1100 1900	100 —	0.5 8.5	— 2.7	— —	**25D8GT**
26C6	D+D+T		7BT	Min.-7	Htr.	26.5	0.07	Same as 7E6												**26C6**
55, S	D+D+T		6G	Small-6	Htr.	2.5	1.0	Same as 6V7G												**55, S**
75	D+D+T		6G	Small-6	Htr.	6.3	0.3	Same as 2A6												**75**
85	D+D+T		6G	Small-6	Htr.	6.3	0.3	Same as 6V7G												**85**

85AS	D+D+T		6G	Small-6	Htr.	6.3	0.3	—	—	A-F Class A	250	—	—9.0	16K	1250	20	4.5	—	—	**85AS**

★Class Code:

D+P=Diode-pentode.	D+D+T=Duodiode-triode.
D+T+P=Diode-triode-pentode.	D+D+P=Duodiode-pentode.
D+T=Diode-triode.	T+P=Triode-pentode.

TABLE III. CBS TRIODES—GENERAL PURPOSE (Single and Double Triodes)

	DESCRIPTION		CONSTRUCTION		CATHODE			MAX. RATINGS		SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION						
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	PLATE WATTS	APPLICATION	PLATE VOLTS	GRID VOLTS	PLATE RESISTANCE	TRANSCONDUCTANCE µmhos	AMP. FACTOR (µ)	PLATE MA	TYPE
00			4D	Medium-4	Fil.	5.0	1.0	—	—	Detector	45	—	30K	660	20	1.5	00
00A		01A	4D	Medium-4	Fil.	5.0	0.25	—	—	Detector	45	0	30K	660	20	1.5	00A
01	S		4D	Medium-4	Fil.	5.0	1.0	—	—	Detector Class A Amp.	90	—4.5	11K	725	8	2.5	01
01A	S	00A 01B	4D	Medium-4	Fil.	5.0	0.25	—	—	Detector Class A Amp.	90	—4.5	11K	725	8	2.5	01A
01AA	S	01A	4D	Medium-4	Fil.	5.0	0.25	—	—	Detector Class A Amp.	90	—4.5	94K	850	8	3.2	01AA
01B	S	01A	4D	Medium-4	Fil.	5.0	.125	—	—	Detector Class A Amp.	90	—4.5	11K	725	8	2.5	01B
1E4G	S	1E5GP 1E5GT	5S	Octal	Fil.	1.4	0.05	110	—	Detector Class A Amp.	90 90	0 —3	11K 19K	1300 760	14.5 14.5	4.5 1.4	1E4G
1G4G, GT	S		5S	Octal	Fil.	1.4	0.05	110	—	Detector	90	—6.0	10K	825	8.8	2.3	1G4G, GT

1H4G, GT	D		5S	Octal	Fil.	2.0	0.06	—	—	Class A Amplifier*	90 135 180	—4.5 —9.0 —13.5	11K 10K 10.3K	850 900 900	9.3 9.3 9.3	2.5 3.0 3.1	**1H4G, GT**
1LE3	S		4AA	Loctal	Fil.	1.4	0.05	Same as 1E4G									**1LE3**
1LF3	S		4AA	Loctal	Fil.	1.4	0.05	Same as 1E4G									**1LF3**
3A5	D		7BC	Min.-7	Fil.	1.4 2.8	0.27 0.11	135	0.5	Class A Amp.*	90	—2.5	8.3K	1800	15	3.7	**3A5**
3C6	D	3B7/1291	7BW	Loctal	Fil.	1.4 2.8	0.10 0.05	—	—	Detector Amplifier*	90 90	0 0	11K 12K	1300 1300	14.5 14.1	4.5 3.2	**3C6**
6AD5G, GT	S	6F5GT	6Q	Octal	Htr.	6.3	0.3	—	—	Class A Amp.	250	—2.0	66K	1500	100	0.9	**6AD5G, GT**
6AE5GT	S	6AF5G	6Q	Octal	Htr.	6.3	0.3	300	2.5	Class A Amp.	95	—15.0	3.5K	1200	4.2	7.0	**6AE5GT**
6AE6G	D		7AH	Octal	Htr.	6.3	0.15	—	—	Remote Cutoff Class A Amp.* Sharp Cutoff Class A Amp.*	250 250 250 250	—1.5 —35.0 —1.5 —9.5	25K — 35K —	1000 — 950 —	25.0 — 33.0 —	6.5 0.01 4.5 0.01	**6AE6G**
6AE7G, GT	D		7AX	Octal	Htr.	6.3	0.50	—	—	Twin-input Driver*	250	—13.5	9.3K	1500	14	5.0	**6AE7G, GT**
6AF5G	S		6Q	Octal	Htr.	6.3	0.3	—	—	Class A Amp.	180	—18.0	4.9K	1500	7.4	7.0	**6AF5G**
6AH7GT	D		8BE	Octal	Htr.	6.3	0.3	180	1.5	Class A Amp.	100 180	—3.6 —6.5	10.3K 8.4K	1550 1900	16 16	3.7 7.6	**6AH7GT**
6AJ4	S	6AM4	9BX	Min.-7	Htr.	6.3	0.225	—	—	UHF Amplifier	125	68†	4.2K	10000	42	16	**6AJ4**

†Self bias cathode resistor. ‡Conversion Transconductance. *Each unit. ★Class Code: S=Single triode. D=Duotriode.

TABLE III. (continued) Triodes—General Purpose

	DESCRIPTION		CONSTRUCTION		CATHODE			MAX. RATINGS		SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION						
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	PLATE WATTS	APPLICATION	PLATE VOLTS	GRID VOLTS	PLATE RESISTANCE	TRANSCONDUCTANCE µmhos	AMP. FACTOR (µ)	PLATE MA	TYPE
6AN4	S	6AM4	7DK	Min.-7	Htr.	6.3	0.225	300	4	UHF Class A UHF Mixer	200 125	100† 270†	— $E_{osc}=1.4$	10000 2900‡	70 —	13.0 7.0	**6AN4**
6AS7G	D		8BD	Octal	Htr.	6.3	2.5	250	13.0*	D-C Amp.*	135	250†	280	7000	2.0	125	**6AS7G**
6BF7	D	6BG7	8DG	Submin.-8	Htr.	6.3	0.3	300	1.0*	Class A Amp.* Mixer	100 150	50† 820†	7.1K 10K	5300 1900‡	38 $E_{osc}=2.1$	8.5 4.8	**6BF7**
6BG7	D	6BF7	8DG	Submin.-8	Htr.	6.3	0.3	—	—	Same as 6BF7							**6BG7**
6C8G	D		8G	Octal	Htr.	6.3	0.3	—	—	Class A Amp.*	250	—4.5	22.5K	1600	36	3.2	**6C8G**
6F4	S		7BR	Acorn	Htr.	6.3	0.225	—	—	Class A Amp.	80	150†	2.9K	5800	17.0	13.0	**6F4**
6F5, G, GT	S	6SF5GT	5M	Octal	Htr.	6.3	0.3	300	—	Class A Amp.	100 250	—1.0 —2.0	85K 85K	1150 1500	100 100	0.4 0.9	**6F5, G, GT**
6F8G	D	6SN7GT	8G	Octal	Htr.	6.3	0.6	300	2.5*	Class A Amp.*	90 250	0 —8.0	6.7K 7.7K	3000 2600	20 20	10.0 9.0	**6F8G**

6J4	S		7BQ	Min.-7	Htr.	6.3	0.4	150	2.25	UHF Amplifier	100 150	100† 100†	— —	11000 12000	55 55	10.0 15.0	**6J4**
6K4	S		6K4	Submin.-5	Htr.	6.3	0.15	—	—	R-F Amplifier	200	—8.0	4650	3450	16	11.5	**6K4**
6K5G, GT	S	6F5GT	5U	Octal	Htr.	6.3	0.3	—	—	Class A Amp.	250	—3.0	50K	1400	70	1.10	**6K5G, GT**
6L5G	S		6Q	Octal	Htr.	6.3	0.15	250	—	Class A Amp.	135 250	—5.0 —9.0	11.3K 9K	1500 1900	17 17	3.5 8.0	**6L5G**
6N4	S	6C4	7CA	Min.-7	Htr.	6.3	0.2	180	3.0	UHF Amplifier	180	—3.5	5.4K	6000	32	12.0	**6N4**
6P5GT	S		6Q	Octal	Htr.	6.3	0.3	250	1.25	Class A Amp.	100 250	—5.0 —13.5	2K 9.5K	1150 1450	13.8 13.8	2.5 5.0	**6P5GT**
6Q4	S		9S	Min.-9	Htr.	6.3	0.48	—	—	R-F Amplifier	250	—1.0	—	12000	80	15	**6Q4**
6SF5, GT	S	6F5GT	6AB	Octal	Htr.	6.3	0.3	300	—	Class A Amp.	250	—2.0	66K	1500	100	0.9	**6SF5, GT**
6SU7GTY	D	6SL7GT	8BD	Octal	Htr.	6.3	0.3	—	—	Class A Amp.*	250	—2.0	44K	1600	70	2.3	**6SU7GTY**
7A4	S	7N7	5AC	Loctal	Htr.	6.3	0.3	—	—	Class A Amp.*	90 250	0 —8.0	6.7K 7.7K	3000 2600	20 20	10.0 9.0	**7A4**
7AF7	D		8AC	Loctal	Htr.	6.3	0.3	300	2.5*	Class A Amp.*	100 100 250	0 —3.0 —10.0	6.5K 8.4K 7.6K	2600 1900 2100	17 16 16	10.8 5.0 9.0	**7AF7**
7B4	S		5AC	Loctal	Htr.	6.3	0.3	Same as 6SF5									**7B4**
7E5	S		8BN	Loctal	Htr.	6.3	0.15	250	4.0	Class A Amp.	180	—3.0	12K	3000	36	5.5	**7E5**

†Self bias cathode resistor. ‡Conversion Transconductance. *Each unit. ★Class Code: S=Single triode. D=Duotriode.

TABLE III. (continued) Triodes—General Purpose

	DESCRIPTION			CONSTRUCTION		CATHODE		MAX. RATINGS		SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION						
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	PLATE WATTS	APPLICATION	PLATE VOLTS	GRID VOLTS	PLATE RESISTANCE	TRANSCONDUCTANCE µmhos	AMP. FACTOR (µ)	PLATE MA	TYPE
7F7	D	6SL7	8AC	Loctal	Htr.	6.3	0.3	300	1.0*	Class A Amp.*	100 250	—1.0 —2.0	62K 44K	1125 1600	70 70	0.65 2.3	**7F7**
7F8	D		8BW	Loctal	Htr.	6.3	0.3	300	1.75*	Class A Amp.*	250	500†	—	3300	48	6.0	**7F8**
7N7	D	6SN7GT	8AC	Loctal	Htr.	6.3	0.6	300	2.5*	Class A Amp.*	90 250	0 —8.0	6.7K 7.7K	3000 2600	20 20	10.0 9.0	**7N7**
11	S		4F	Medium-4	Fil.	1.1	0.25	—	—	Detector Class A Amp.	90 135	—4.5 —10.5	15.5K 15K	425 440	6.6 6.6	2.5 3.0	**11**
12	S		4D	Medium-4	Fil.	1.1	0.25	Same as 11									**12**
12AH7GT	D		8BE	Octal	Htr.	12.6	0.15	Same as 6AH7GT									**12AH7GT**
12AY7	D		9A	Min.-9	Htr.	12.6 6.3	0.15 0.3	300 —	1.5* —	Low Noise Class A Amp.*	250 150	—4.0 2700†	— $R_L=20K$	1750 $C_k=40\mu f$	40 $R_g=100K$	3.0 VG=12.5	**12AY7**
12F5GT	S	12SF5GT	5M	Octal	Htr.	12.6	0.15	Same as 6F5									**12F5GT**

12G4	S	12H4	6BG	Min.-7	Htr.	12.6	0.15	300	2.5	Class A Amp.	90 250	0 —8.0	— —	3000 2600	20.0 20.0	10.0 9.0	**12G4**
12H4	S	12AU7	7DW	Min.-7	Htr.	12.6 6.3	0.15 0.3	300 —	2.5 —	Class A Amp.	90 250	0 —8.0	— —	3000 2600	20.0 20.0	10.0 9.0	**12H4**
12SC7	D		8S	Octal	Htr.	12.6	0.15	250	—	Class A Amp.	250	—2.0	53K	1325	70	2.0	**12SC7**
12SF5, GT	S		6AB	Octal	Htr.	12.6	0.15	Same as 6SF5 ● 6SF5GT									**12SF5, GT**
12SL7GT	D		8BD	Octal	Htr.	12.6	0.15	300	1.0*	Class A Amp.*	250	—2.0	44K	1600	70.0	2.3	**12SL7GT**
14A4	S	14N7	5AC	Loctal	Htr.	12.6	0.15	Same as 7A4									**14A4**
14AF7	D		8AC	Loctal	Htr.	12.6	0.15	Same as 7AF7									**14AF7**
14F7	D	12SL7	8AC	Loctal	Htr.	12.6	0.15	Same as 7F7									**14F7**
14F8	D		8BW	Loctal	Htr.	12.6	0.15	Same as 7F8									**14F8**
14N7	D	12SN7GT	8AC	Loctal	Htr.	12.6	0.30	Same as 7N7									**14N7**
26	S		4D	Octal	Fil.	1.5	1.05	180	—	R-F Amplifier Class A	90 135 180	—7.0 —10.0 —14.5	8.9K 7.6K 7.3K	935 1100 1150	8.3 8.3 8.3	2.9 5.5 6.2	**26**
27	S	37, 76	5A	Octal	Htr.	2.5	1.75	275	—	Detector Class A Amp.	90 135 180	—6.0 —9.0 —13.5	11K 9K 9K	820 1000 1000	9 9 9	2.7 4.5 5.0	**27**

†Self bias cathode resistor. ‡Conversion Transconductance. *Each unit. ★Class Code: S=Single triode. D=Duotriode.

TABLE III. (continued) Triodes—General Purpose

	DESCRIPTION			CONSTRUCTION		CATHODE		MAX. RATINGS		SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION						
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	PLATE WATTS	APPLICATION	PLATE VOLTS	GRID VOLTS	PLATE RESISTANCE	TRANSCONDUCTANCE µmhos	AMP. FACTOR (µ)	PLATE MA	TYPE
30	S	1H4GT	4D	Octal	Fil.	2.0	0.06	180	—	Detector Class A Amp.	90 135 180	—4.5 —9.0 —13.5	11K 10.3K 10.3K	850 900 900	9.3 9.3 9.3	2.5 3.0 3.1	**30**
37	S	76, 27	5A	Octal	Htr.	6.3	0.3	250	—	Detector Class A Amp.	90 135 180	—6.0 —9.0 —13.5	11.5K 10K 10.2K	800 925 900	9.2 9.2 9.2	2.5 4.1 4.3	**37**
40	S		4D	Octal	Fil.	5.0	0.25	—	—	Class A Amp.	135 180	—1.5 —3.0	150K 150K	200 200	30 30	0.2 0.2	**40**
56	S	27	5A	Octal	Htr.	2.5	1.0	—	—	Detector Class A Amp.	100 250 100 250	—8.0 —20.0 —5.0 —13.5	Bias for I_b=0.2 ma, no signal 12K 9.5K	1150 1450	13.8 13.8	2.5 5.0	**56**
56AS	S	37, 76	5A	Octal	Htr.	6.3	0.40	Same as 56									**56AS**
67 A			5A	Octal	Htr.	6.3	0.40	—	—	Detector Amp.	180	—13.5	10.2K	—	9.2	4.3	**67 A**

76	S	6C5GT	5A	Octal	Htr.	6.3	0.3	250	—	Detector Class A Amp.	100 250 100 250	—8.0 —20.0 —5.0 —13.5	Bias for I_b=0.2 ma, no signal 12K 9.5K	1150 1450	13.8 13.8	2.5 5.0	**76**
401	S		4D	Octal	Htr.	3.0	1.35	—	—	Detector Class A Amp.	90	—3.0	9.5K	1000	9.5	5.0	**401**
484	S		5A	Octal	Htr.	2.8	1.6	—	—	Detector Class A Amp.	180	—9.0	9.3K	1350	12.5	6.0	**484**
9002	S		7BS	Min.-7	Htr.	6.3	0.15	250	1.6	Class A Amp.	250	—7.0	11.4K	2200	25	6.3	**9002**

†Self bias cathode resistor. ‡Conversion Transconductance. *Each unit. ★Class Code: S=Single triode. D=Duotriode.

TABLE IV. CBS VOLTAGE AMPLIFIERS (Tetrodes, Pentodes and Heptodes)

	DESCRIPTION				CONSTR.	CATHODE		MAX. RATINGS				SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION									
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID 1 VOLTS	CATHODE RES., OHMS & MISCELLANEOUS	PLATE RESISTANCE MEG. (APPROXIMATE)	TRANSCONDUCTANCE μmhos	PLATE MA	SCREEN MA	GRID VOLTS (APPROX.) FOR CUTOFF	TYPE
1A4P	P	1D5GT 1E5GT	4M	Small-4	Fil.	2.0	0.06	180	67.5	—	—	R-F Amp. Class A	135 180	67.5 67.5	—3.0 —3.0	— —	1.0 1.0	625 725	2.2 2.3	0.9 0.8	—15 —15	**1A4P**
1A4T	TE		4K	Small-4	Fil.	2.0	0.06	180	67.5	—	—	R-F Amp. Class A	135 180	67.5 67.5	—3.0 —3.0	— —	0.35 0.6	625 650	2.2 2.2	0.7 0.7	— —	**1A4T**
1AB5	P		5BF	Loctal	Fil.	1.2	0.13	—	—	—	—	R-F Amp.	90 150	90 150	0 —1.5	— —	0.275 0.12	1100 1350	3.5 6.8	0.8 2.0	— —	**1AB5**
1AF4	P	1U4	6AR	Min.-7	Fil.	1.4	0.025	110	90	—	—	R-F Amp. Class A	67.5 90.0	67.5 90.0	0 0	— —	2.0 1.8	925 1050	1.2 1.8	0.3 0.55	—2.8 —3.8	**1AF4**
1B4P	P	951 1E5GT	4M	Small-4	Fil.	2.0	0.06	180	67.5	—	—	R-F Amp. Class A	90 180	67.5 67.5	—3.0 —3.0	— —	1.0 1.5	600 650	1.6 1.7	0.7 0.6	—8.0 —8.0	**1B4P**
1B4T	TE	951 1E5GT	4K	Small-4	Fil.	2.0	0.06	—	—	—	—	R-F Amp. Class A	180	67.5	—3.0	—	1.0	650	1.75	0.4	—	**1B4T**
1B6	P		7AK	Min.-7	Fil.	1.4	0.05	—	—	—	—	R-F Amp. Class A	90	67.5	—1.5	—	0.8	750	1.5	0.8	—	**1B6**

1D5GP	P	1A4P	5Y	Octal	Fil.	2.0	0.06	Same as 1A4P													**1D5GP**
1D5GT	TE	1A4T	5R	Octal	Fil.	2.0	0.06	Same as 1A4T													**1D5GT**
1E5GP	P	1D5GP	5Y	Octal	Fil.	2.0	0.06	—	—	—	—	R-F Amp. Class A	135 180	67.5 67.5	—3.0 —3.0	— —	1.5 1.5	560 650	1.6 1.7	0.7 0.6	— —8.0	**1E5GP**
1E5G, GT	TE	1E5GP	5R	Octal	Fil.	2.0	0.06	—	—	—	—	R-F Amp. Class A	180	67.5	—3.0	—	1.2	650	1.7	0.4	—	**1E5G, GT**
1LC5	P		7AO	Loctal	Htr.	1.4	.05	110	45	—	—	R-F Amp. Class A	45 90	45 45	0 0	R_{g1} =1.0meg R_{g1} =1.0meg	.7 1.5	750 775	1.1 1.15	0.35 0.30	—3.4 —3.4	**1LC5**
1LG5	P		7AO	Loctal	Fil.	1.4	0.05	110	110	—	—	R-F Amp. Class A	90 90	90 45	—1.5 0	R_{g1} =2.0meg R_{g1} =2.0meg	0.5 > 1.0	1150 800	3.7 1.7	0.9 0.4	—19 —10	**1LG5**
1LN5	P	1LC5 1N5GT	7AO	Loctal	Fil.	1.4	0.05	110	110	—	—	R-F Amp. Class A	90	90	0	—	1.1	800	1.6	0.35	—4.5	**1LN5**
1N5GT	P	1LN5	5Y	Octal	Fil.	1.4	0.05	110	110	—	—	R-F Amp. Class A	90	90	0	—	1.5	750	1.2	0.3	—3.2 —4.0	**1N5GT**
1P5G, GT	P	1N5GT 1T4	5Y	Octal	Fil.	1.4	0.05	110	110	—	—	R-F Amp. Class A	90	90	0	—	.8	750	2.3	0.7	—12	**1P5G, GT**
1SA6GT	P	1N5GT	6BD	Octal	Fil.	1.4	0.05	—	—	—	—	R-F Amp.	45 67.5 90	45 67.5 67.5	0 0 0	— — —	.7 .6 .8	750 950 970	1.1 2.4 2.45	0.3 0.7 0.68	— — —	**1SA6GT**
3E6	P		7CJ	Loctal	Fil.	1.4 2.8	0.1 .050	110 110	110 110	— —	— —	R-F Amp. Class A	90 90	90 90	0 0	R_{g1} =2.0meg R_{g1} =2.0meg	0.25 0.325	2000 1700	4.2 2.9	1.7 1.2	—5.5 —4.0	**3E6**

†Triode connected, screen and suppressor tied to plate. ♦Each section. ★Class Code: H=Heptode. P=Pentode. TE=Tetrode.

TABLE IV. (continued) Voltage Amplifiers

	DESCRIPTION		CONSTR.		CATHODE			MAX. RATINGS				SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION									
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID 1 VOLTS	CATHODE RES., OHMS & MISCELLANEOUS	PLATE RESISTANCE MEG. (APPROXIMATE)	TRANSCONDUCTANCE µmhos	PLATE MA	SCREEN MA	GRID VOLTS (APPROX.) FOR CUTOFF	TYPE
6AB7/1853	P	6AC7	8N	Octal	Htr.	6.3	0.45	300	200	3.75	0.65	R-F Amp. Class A	300 300	200 200	—3.0 3.0	— R_{g2}=.3meg	.7 .7	5000 5000	12.5 12.5	3.2 3.2	—15 —22.5	**6AB7/1853**
6AJ5	P		7BD	Min.-7	Htr.	6.3	0.175	180	140	1.7	0.5	Class A	28	28	—1	—	.1	2500	2.7	1.0	—4.5	**6AJ5**
6AJ7	P	6AC7	8N	Octal	Htr.	6.3	0.45	300	150	3.02	0.38	Class A	300	150	E_{c3}=0	160	1.0	9000	10.0	2.5	—	**6AJ7**
6AS6	P		7CM	Min.-7	Htr.	6.3	0.175	180	140	1.7	.75	R-F Amp. Class A	120 120	120 120	—2.0 —2.0	E_{c3}=—3 E_{c3}=0	— .11	1850 3200	3.6 5.2	4.8 3.5	—10 —7.5	**6AS6**
6BU5	P	6BD4A	8FP	Octal	Htr.	6.3	0.15	20000	100	20	0.1	TV High Voltage Regulator	20000 20000	70 70	—3.4 —2.4	— E_{c3}=0	— —	— —	0.55 1.0	— 0.4	— —6.5	**6BU5**
6C6	P	77	6F	Octal	Htr.	6.3	0.3	300 250†	125 —	0.75 1.75†	0.1 —	Class A {Pentode Triode†	100 250 180 250	100 100 — —	—3.0 —3.0 —5.3 —8.0	— — μ=20 μ=20	1.0 1.0 .011 .011	1185 1225 1800 1900	2.0 2.0 5.3 6.5	0.5 0.5 — —	—7 —7 — —	**6C6**
6D6	P	6K7GT	6F	Small-6	Htr.	6.3	0.3	300	100	2.25	0.25	R-F Amp. Class A	100 250	100 100	—3.0 —3.0	— —	0.25 0.8	1500 1600	8.0 8.2	2.2 2.0	—50 —50	**6D6**

6D7	P	6E7	7H	Small-7	Htr.	6.3	0.3	Same as 6C6														**6D7**
6DB6	P		7CM	Min.-7	Htr.	6.3	0.3	300	150	3.0	1.0	Class A	150	150	—1.0	G_3 Volts= —3	.05	g_m $G_1=2050$ g_m $G_3=1000$	5.8	6.6	G_1—6.5 G_3—9.5	**6DB6**
6E7	P	6D6	7H	Small-7	Htr.	6.3	0.3	Same as 6D6														**6E7**
6J7, G, GT	P	6C6 6D6	7R	Octal	Htr.	6.3	0.3	300 250†	125 —	0.75 1.75†	0.10 —	Class A {Pentode {Triode†	100 250 180 250	100 100 — —	—3.0 —3.0 —5.3 —8.0	— — — —	1.0 > 1.0 .0110 .0105	1185 1225 1800 1900	2.0 2.0 5.3 6.5	0.5 0.5 — —	—7 —7 — —	**6J7, G, GT**
6R6G	P		6AW	Octal	Htr.	6.3	0.3	—	—	—	—	R-F Amp. Class A	250	100	—3.0	—	.8	1450	7.0	1.7	—	**6R6G**
6S7G	P	6SS7	7R	Octal	Htr.	6.3	0.15	300	100	2.25	0.25	R-F Amp. Class A	135 250	67.5 100	—3.0 —3.0	— —	3.0 1.0	1250 1750	3.7 8.5	0.9 2.0	—25 —38.5	**6S7G**
6SD7GT	P		8N	Octal	Htr.	6.3	0.3	300	125	4	.4	R-F Amp. Class A	100 250 250	100 100 125	—2.0 —2.0 —2.0	— — —	0.25 1.0 0.7	3350 3000 4250	5.7 6.0 9.5	2.0 1.9 3.0	—11 —11 —27	**6SD7GT**
6SE7GT	P	6SJ7GT	8N	Octal	Htr.	6.3	0.3	—	—	—	—	R-F Amp. Class A	100 250	100 100	—1.0 —1.5	— —	0.25 1.0	3100 3400	5.5 4.5	2.4 1.5	— —	**6SE7GT**
6SS7	P	6SG7GT 6W7G	8N	Octal	Htr.	6.3	0.15	300	100	2.25	0.35	R-F Amp. Class A	100 250	100 100	—1.0 —3.0	— —	0.12 1.0	1930 1850	12.2 9.0	3.1 2.0	—35 —35	**6SS7**
6U7G	P	6SK7GT	7R	Octal	Htr.	6.3	0.3	300	100	2.25	0.25	R-F Amp. Class A	100 250	100 100	—3.0 —3.0	$E_{c3}=0$ $E_{c3}=0$	0.25 0.8	1500 1600	8.0 8.2	2.2 2.0	— —	**6U7G**
6W7G	P		7R	Octal	Htr.	6.3	0.15	—	—	—	—	R-F Amp. Class A	250	100	—3.0	—	1.5	1225	2.0	0.5	—	**6W7G**

†Triode connected, screen and suppressor tied to plate. ♦Each section. ★Class Code: H=Heptode. P=Pentode. TE=Tetrode.

TABLE IV. (continued) Voltage Amplifiers

	DESCRIPTION		CONSTR.		CATHODE			MAX. RATINGS				SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION									
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID 1 VOLTS	CATHODE RES. OHMS & MISCELLANEOUS	PLATE RESISTANCE MEG. (APPROXIMATE)	TRANSCONDUCTANCE µmhos	PLATE MA	SCREEN MA	GRID VOLTS FOR CUTOFF (APPROX.)	TYPE
7A7	P	6SK7 7B7	8V	Loctal	Htr.	6.3	0.3	300	125	4.0	0.4	R-F Amp. Class A	100 250	100 100	—1.0 —3.0	60 260	0.12 0.8	2350 2000	13.0 9.2	4.0 2.6	—35 —35	**7A7**
7AB7	P		8BO	Loctal	Htr.	6.3	0.15	300	100	1.2	0.15	R-F Amp Class A	250	100	—2.0	—	0.5	1800	4.0	1.3	—9	**7AB7**
7AD7	P	6AG7	8V	Loctal	Htr.	6.3	0.6	300	300	10.0	1.2	Video Class A	300	150	—3.0	68	0.3	9500	28.0	7.0	—	**7AD7**
7AG7	P	6SH7	8V	Loctal	Htr.	6.3	0.15	300	300	2.0	0.75	R-F Amp Class A	100 250	100 250	—1.0 0	— 250	1.0 1.0	2600 4200	1.6 6.0	0.5 2.0	—3.5 —10.0	**7AG7**
7AH7	P		8V	Loctal	Htr.	6.3	0.15	300	300	2.0	0.7	Class A	250	250	—	250	1.0	3300	6.8	1.9	—20	**7AH7**
7AJ7	P		8V	Loctal	Htr.	6.3	0.3	300	100	1.0	0.1	Class A	100 250	100 100	—1.0 —3.0	130 100	0.4 1.0	2275 1575	5.7 2.2	1.8 0.7	— —	**7AJ7**
7B7	P	6SK7 7A7	8V	Loctal	Htr.	6.3	0.15	300	100	2.25	0.25	R-F Amp. Class A	100 250	100 100	—3.0 —3.0	300 300	0.3 0.75	1675 1750	8.2 8.5	1.8 1.7	—40 —40	**7B7**
7C7	P	6SJ7	8V	Loctal	Htr.	6.3	0.3	300	100	1.0	0.1	Class A	100 250	100 100	—1.0 —3.0	130 1000	0.4 1.0	2275 1575	5.7 2.2	1.8 0.7	—7 —7	**7C7**

7G7	P		8V	Loctal	Htr.	6.3	0.45	300	100 E_{c2} supply=300V	1.5	0.3	R-F Amp. Class A	250	100	-2.0	E_{c3}=0	0.8	4500	6.0	2.0	-7	**7G7**
7G8	TE+TE		8BV	Loctal	Htr.	6.3	0.3	300	100	♦1.5	♦0.1	R-F Amp. Class A♦	250	100	-2.5	—	0.225	2100	4.5	0.8	-11	**7G8**
7H7	P	6AB7	8V	Loctal	Htr.	6.3	0.3	300	150	2.5	0.5	R-F Amp. Class A	100 250	100 150	-1.5 0	— 180	0.35 0.8	4000 4000	7.5 10.0	2.6 3.2	-12 -19	**7H7**
7L7	P	6SE7	8V	Loctal	Htr.	6.3	0.3	300	125	4.0	0.4	R-F Amp. Class A	100 250	100 100	-1.0 -1.5	125 250	0.1 1.0	3000 3100	5.5 4.5	2.4 1.5	-6 -6	**7L7**
7T7	P		8V	Loctal	Htr.	6.3	0.3	300	150	3.0	0.7	R-F Amp. Class A	100 250	100 150	-1.0 -1.0	— —	0.35 0.9	4000 4900	5.3 10.8	2.1 4.1	-4.0 -5.5	**7T7**
7V7	P	7W7	8V	Loctal	Htr.	6.3	0.45	300	150	4.0	0.8	R-F Amp. Class A	300 300	150 E_{cc2}=300	— R_{g2}=40K	160 160	0.3 0.3	5800 5800	10.0 10.0	3.9 3.9	-8 -16	**7V7**
7W7	P	7V7	8BJ	Loctal	Htr.	6.3	0.45	300	150	4.0	0.8	R-F Amp. Class A	300 300	150 E_{cc2}=300	— R_{g2}=40K	160 160	0.3 0.3	5800 5800	10.0 10.0	3.9 3.9	-8 -16	**7W7**
12AH6	P	6AH6	7BK	Min.-7	Htr.	12.6	0.225	300	150	3.2	0.4	Class A Pentode Triode†	300 150	150 —	E_{c3}=0 E_{c3}=0	160 160	500K 3.6K	9000 11000	10.0 12.5	2.5 μ=40	-7.0 -7.0	**12AH6**
12AW6	P	12AU6	7CM	Min.-7	Htr.	12.6	0.15	300 300†	150 —	2.0 2.5†	0.5 —	Class A Pentode Triode†	100 250 180 250	100 150 — —	— — — —	100 200 350 825	0.3 0.8 7.9K 11K	4750 5000 5700 3800	5.5 7.0 7.0 5.5	1.6 2.0 μ=45 μ=42	-5.0 -8.0 — —	**12AW6**
12B7	P	14A7	8V	Loctal	Htr.	12.6	0.15	Same as 7A7														**12B7**

†Triode connected, screen and suppressor tied to plate. ♦Each section. ★Class Code: H=Heptode. P=Pentode. TE=Tetrode.

TABLE IV. (continued) Voltage Amplifiers

	DESCRIPTION			CONSTR.		CATHODE		MAX. RATINGS				SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION									
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID 1 VOLTS	CATHODE RES., OHMS & MISCELLANEOUS	PLATE RESISTANCE MEG. (APPROXIMATE)	TRANSCONDUCTANCE µmhos	PLATE MA	SCREEN MA	GRID VOLTS (APPROX.) FOR CUTOFF	TYPE
12CS6	H	6CS6	7CH	Min.-7	Htr.	12.6	0.15	300	100	1.0	1.0	Class A	100 100	30 30	0 −1.0	$E_{c3}=-1$ $E_{c3}=0$	0.7 1.0	1250 950	0.8 0.75	4.0 1.1	— —	**12CS6**
12J7, G, GT	P	12SJ7	7R	Octal	Htr.	12.6	0.15	Same as 6J7														**12J7, G, GT**
12K7G, GT	P		7R	Octal	Htr.	12.6	0.15	300	125	2.75	0.35	R-F Amp. Class A	100 250	100 125	−1.0 −3.0	$E_{c3}=0$ $E_{c3}=0$	0.15 0.6	1650 1650	9.5 10.5	2.7 2.6	−38.5 −52.5	**12K7G, GT**
12SH7	P	6SH7	8BK	Octal	Htr.	12.6	0.15	300	150	3.0	0.7	R-F Amp. Class A	100 250	100 150	−1.0 −1.0	— —	0.35 0.90	4000 4900	5.3 10.8	2.1 4.1	−4.0 −5.5	**12SH7**
12SJ7, GT	P	6SJ7	8N	Octal	Htr.	12.6	0.15	300 250†	100 —	2.5 2.5†	0.4 —	R-F Amp. Class A Pentode Triode†	100 250 250	100 100 —	−3.0 −3.0 −8.5	— — —	0.7 1.0 7.6K	1575 1650 2500	2.9 3.0 9.2	0.9 0.8 $\mu=19$	−8.0 −8.0 —	**12SJ7, GT**
14A7	P	12B7	8V	Loctal	Htr.	12.6	0.15	Same as 7A7														**14A7**
14C7	P	12B7	8V	Loctal	Htr.	12.6	0.15	Same as 7C7														**14C7**
14H7	P		8V	Loctal	Htr.	12.6	0.15	Same as 7H7														**14H7**

14W7	P		8BJ	Loctal	Htr.	12.6	0.225	Same as 7W7														**14W7**
15	P		5F	Small-5	Htr.	2.0	0.22	—	—	—	—	R-F Amp. Class A	67.5 135	67.5 67.5	—1.5 —1.5	— —	0.63 0.8	710 750	1.85 1.85	0.3 0.3	— —	**15**
22	TE		4K	Medium-4	Fil.	3.3	0.132	—	—	—	—	R-F Amp. Class A	135	67.5	—1.5	—	0.25	500	3.7	1.3	—	**22**
24A	TE	58	5E	Small-5	Htr.	2.5	1.75	275	90	—	—	R-F Amp. Class A	180 250	90 90	—3.0 —3.0	— —	0.4 0.6	1000 1050	4.0 4.0	1.7 1.7	— —	**24A**
26A6	P		7BK	Min.-7	Htr.	26.5	0.07	—	—	—	—	R-F Amp.	26.5 250	26.5 250	0 —	R_{g1}=2 meg 125	0.25 1.0	2000 4000	1.7 10.5	0.7 4.0	— —	**26A6**
32	TE		4K	Medium-4	Fil.	2.0	0.06	180	67.5	—	—	R-F Amp. Class A	135 180	67.5 67.5	—3.0 —3.0	— —	0.95 1.2	640 650	1.7 1.7	0.4 0.4	— —	**32**
34	P		4M	Medium-4	Fil.	2.0	0.06	180	67.5	—	—	R-F Amp. Class A	67.5 135 180	67.5 67.5 67.5	—3.0 —3.0 —3.0	— — —	0.4 0.6 1.0	560 600 620	2.7 2.8 2.8	1.1 1.0 1.0	—22.5 —22.5 —22.5	**34**
35/51	TE		5E	Medium-5	Htr.	2.5	1.75	250	90	—	—	R-F Amp. Class A	180 250	90 90	—3.0 —3.0	— —	0.3 0.4	1020 1050	6.3 6.5	2.5 2.5	—40 —40	**35/51**
36	TE	6C6	5E	Small-5	Htr.	6.3	0.3	250	90	—	—	R-F Amp. Class A Detector	135 180 250 250	67.5 90 90 90	—1.5 —3.0 —3.0 —8.0	— — — Adjust I_b to 0.1 ma, no signal. R_L=0.25 meg.	0.475 0.50 0.55	1000 1050 1080	2.8 3.1 3.2	— — 1.7	— — —	**36**
39/44	P	6D6 78	5F	Small-5	Htr.	6.3	0.3	250	90	—	—	R-F Amp. Class A	90 180 250	90 90 90	—3.0 —3.0 —3.0	— — —	0.375 0.75 1.0	960 1000 1050	5.6 5.8 5.8	1.6 1.4 1.4	— — —	**39/44**

†Triode connected, screen and suppressor tied to plate. ♦Each section. ★Class Code: H=Heptode. P=Pentode. TE=Tetrode.

TABLE IV. (continued) Voltage Amplifiers

	DESCRIPTION		CONSTR.		CATHODE			MAX. RATINGS				SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION									
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID 1 VOLTS	CATHODE RES., OHMS & MISCELLANEOUS	PLATE RESISTANCE MEG. (APPROXIMATE)	TRANSCONDUCTANCE μmhos	PLATE MA	SCREEN MA	GRID VOLTS (APPROX.) FOR CUTOFF	TYPE
44	P		5F	Small-5	Htr.	6.3	0.3	Same as 39/44														**44**
51, S	TE		5E	Small-5	Htr.	2.5	1.75	Same as 35/51														**51, S**
57	P		6F	Small-6	Htr.	2.5	1.0	300	125	0.75	0.1	Class A Amp. Detector	100 250 250	100 100 100	—3.0 —3.0 —4.3 approx. Adjust I_b to 0.1 ma, no signal	— —	1.0 1.0	1185 1225	2.0 2.0	0.5 0.5	—7.0 —7.0	**57**
57AS	P	6C6, 77	5A	Small-5	Htr.	6.3	0.4	Same as 57														**57AS**
58	P		6F	Small-6	Htr.	2.5	1.0	300	100	2.25	0.25	R-F Amp. Class A	100 250	100 100	—3.0 —3.0	$E_{c3}=0$ $E_{c3}=0$	0.25 0.8	1500 1600	8.0 8.2	2.2 2.0	—50 —50	**58**
58AS	P		6F	Small-6	Htr.	2.5	1.0	Same as 58														**58AS**
64, A	TE		5E	Small-5	Htr.	6.3	0.4	—	—	—	—	R-F Amp. Class A	180	90	—3.0	—	0.5	1050	3.1	1.5	—	**64, A**
65, A	TE		5E	Small-5	Htr.	6.3	0.4	—	—	—	—	R-F Amp. Class A	180	90	—3.0	—	0.75	1000	4.5	1.3	—	**65, A**

77	P	6C6 6J7	6F	Small-6	Htr.	6.3	0.3	300	100	.75	.10	Detector Class A Amp.	100 250	60 100	—1.5 —3.0	$E_{c3}=0$ $E_{c3}=0$	0.6 1.0	1100 1250	1.7 2.3	0.4 0.5	—5.5 —7.5	**77**
78	P	6D6	6F	Small-6	Htr.	6.3	0.3	300	250	2.75	0.35	R-F Amp. Class A	100 250 250	100 100 125	—1.0 —3.0 —3.0	$E_{c3}=0$ $E_{c3}=0$ $E_{c3}=0$	0.15 0.8 0.6	1650 1450 1650	9.5 7.0 10.5	2.7 1.7 2.6	—38 —42 —52	**78**
951	TE	1B4T 1B4P	4K	Medium-4	Fil.	2.0	0.6	—	—	—	—	Class A Amp.	180	67.5	—3.0	—	1.2	650	1.7	0.4	—	**951**
9003	P		7BD	Min.-7	Htr.	6.3	0.15	250	100	1.7	0.3	R-F Amp. Class A	250	100	—3.0	—	0.7	1800	6.7	2.7	—35	**9003**

†Triode connected, screen and suppressor tied to plate. ♦Each section. ★Class Code: H=Heptode. P=Pentode. TE=Tetrode.

TABLE V.

CBS

CONVERTERS AND MIXERS

	DESCRIPTION			CONSTR.		CATHODE		MAXIMUM RATINGS						AVERAGE CHARACTERISTICS AND TYPICAL OPERATION												
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	OSC. ANODE VOLTS	OSC. ANODE WATTS	SCREEN WATTS	CATHODE MA	PLATE VOLTS	SCREEN VOLTS	SIG. GRID VOLTS	OSC. ANODE VOLTS	OSC. GRID RES., MEG.	PLATE MEGOHMS	CONVERSION TRANS. µMHOS	CATHODE MA	PLATE MA	SCREEN MA	OSC. ANODE MA	OSC. GRID MA	TYPE
1A6	H	1C6 1C7G	6L	Small-6	Fil.	2.0	0.06	—	—	—	—	—	—	135 180	67.5 67.5	—3.0 —3.0	135 180	— —	0.4 0.5	275 300	— —	1.8 1.5	2.1 2.0	2.0 2.5	— —	**1A6**
1B7G, GT	H	1A7GT 1L6	7Z	Octal	Fil.	1.4	0.1	—	—	—	—	—	—	90	45	0	90	0.2	0.35	350	—	1.5	1.3	1.6	.035	**1B7G, GT**
1C6	H	—	6L	Small-6	Fil.	2.0	0.12	180	67.5	135	0.4	0.2	9.0	135 180	67.5 67.5	—3.0 —3.0	135 180	0.5 0.5	0.6 0.7	300 325	7.1 7.7	1.3 1.5	2.5 2.0	3.1 4.0	0.2 0.2	**1C6**
1C7G	H	1C6 1D7G	7Z	Octal	Fil.	2.0	0.12	Same as 1C6						Same as 1C6												**1C7G**
1C8	H	—	8CN	Submin.-8	Fil.	1.25	0.04	—	—	—	—	—	—	30	30	0	—	0.1	0.3	100	—	0.32	0.75	—	.030	**1C8**
1D7G	H	1A6	7Z	Octal	Fil.	2.0	0.06	—	—	—	—	—	—	135 180	67.5 67.5	—3.0 —3.0	135 135	.05 .05	0.4 0.5	275 300	6.2 6.2	1.2 1.3	2.5 2.4	2.3 2.3	0.2 0.2	**1D7G**
1L6	H	1U6	7DC	Min.-7	Fil.	1.4	0.05	110	65	110	—	—	4.0	90	45	0	90	0.2	0.65	300	2.35	0.5	0.6	1.2	.035	**1L6**
1LA6	H	1A7GT 1L6	7AK	Loctal	Fil.	1.4	0.05	90	55	90	—	—	3.0	90	45	0	90	0.2	0.75	250	2.4	0.55	0.6	1.2	.035	**1LA6**

1LB6	H	—	8AX	Loctal	Fil.	1.4	0.05	—	—	—	—	—	—	90	67.5	0	—	—	0.2	100	—	0.4	2.2	—	—	**1LB6**
1LC6	H	—	7AK	Loctal	Fil.	1.4	0.05	90	35	45	—	—	3.0	45 90	35 35	0 0	45 45	0.2 0.2	0.65 0.3	250 275	2.9 2.9	0.7 0.7	0.75 0.7	1.4 1.4	.035 .035	**1LC6**
1U6	H	1L6	7DC	Min.-7	Fil.	1.4	0.025	110	65	110	—	—	4.0	65 90	45 45	0 0	67.5 90	0.2 0.2	0.5 0.5	280 300	2.3 2.4	0.5 0.6	0.7 0.6	1.0 1.1	0.028 0.028	**1U6**
2A7/S	H	—	7C	Small-7	Fil.	2.5	0.8	300	100	200	0.75	0.3	14.0	100 250	50 10.0	—1.5 —3.0	100 250*	.05 .05	0.6 0.36	360 550	4.6 10.6	1.1 3.5	1.3 2.7	2.0 4.0	0.25 0.4	**2A7/S**
6A7	H	6A8 6K8	7C	Small-7	Htr.	6.3	0.3	Same as 2A7/S																		**6A7**
6A8, G, GT	H	6A7S 6K8GT	8A	Octal	Htr.	6.3	0.3	Same as 2A7/S																		**6A8, G, GT**
6BA7	H	6SB7Y	8CT	Min.-9	Htr.	6.3	0.3	300	100	—	—	1.5	22	100 250	100 100	—1.0 —1.0	— —	.02 .02	0.5 1.0	900 950	14.2 14.2	3.6 3.8	10.2 10.0	— —	0.35* 0.35*	**6BA7**
6D8, G	H	7A8 6K8	8A	Octal	Htr.	6.3	0.15	300	100	200	0.75	0.3	13	135 250	67.5 100	—3.0 —3.0	135 250*	.05 .05	0.4 0.4	325 550	6.4 10.8	1.5 3.5	1.7 2.6	3.0 4.3	0.2 0.4	**6D8, G**
6J8G	T+H	7J7	8H	Octal	Htr.	6.3	0.3	250	100	150	1.25	—	14	100 250	100 100	—3.0 —3.0	100 250*	.05 .05	0.9 4.0	250 250	— —	1.4 1.3	3.0 2.9	3.0 5.0	0.3 0.4	**6J8G**
6SB7Y	H	6BA7	8R	Octal	Htr.	6.3	0.3	300	100	—	2.0	1.5	22	100 250	100 100	—1.0 —1.0	— —	.02 .02	0.5 1.0	900 950	14.2 14.2	3.6 3.8	10.2 10.0	— —	0.35 0.35	**6SB7Y**
7A8	O	6A7 6A8 7B8	8U	Loctal	Htr.	6.3	0.15	300	200	200	0.75	0.3	13	100 250	75 100	—3.0 —3.0	100* 250*	.05 .05	0.65 0.7	375 550	7.5 10.8	1.8 3.0	2.7 3.2	2.8 4.2	0.2 0.4	**7A8**

★H=Heptode. T+H=Triode and Heptode. T+HX=Triode and Hexode. T+P=Triode and Pentode. O=Octode. *Through 20,000 ohms resistance.

TABLE V. (continued) Converters and Mixers

	DESCRIPTION			CONSTR.		CATHODE		MAXIMUM RATINGS						AVERAGE CHARACTERISTICS AND TYPICAL OPERATION												
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	OSC. ANODE VOLTS	OSC. ANODE WATTS	SCREEN WATTS	CATHODE MA	PLATE VOLTS	SCREEN VOLTS	SIG. GRID VOLTS	OSC. ANODE VOLTS	OSC. GRID RES., MEG.	PLATE MEGOHMS	CONVERSION TRANS. μMHOS	CATHODE MA	PLATE MA	SCREEN MA	OSC. ANODE MA	OSC. GRID MA	TYPE
7B8	H	6J8G 6K8	8X	Loctal	Htr.	6.3	0.3	300	100	200	.75	0.3	14	100 250	50 100	—1.5 —3.0	100 —	.05 .05	0.6 0.36	360 550	4.6 10.6	1.1 3.5	1.3 2.7	2.0 4.0	— —	**7B8**
7J7	T+H	6A8 6K8	8BL	Loctal	Htr.	6.3	0.3	300 150	100 Triode	—	— 1.25	— —	14 —	100 250 150	100 100 —	—3.0 —3.0 —3.0	100 250* Triode	.05 .05	0.5 1.5 .0107	280 290 GM=1400	7.7 9.6	1.5 1.4 6.6	2.6 2.8 —	3.2 5.0 —	0.3 0.4 —	**7J7**
7Q7	H	6SA7	8AL	Loctal	Htr.	6.3	0.3	300	100	—	—	1.0	14	100 250	100 100	—2.0 —2.0	— —	.02 .02	0.5 1.0	525 550	12.3 12.5	3.3 3.5	8.5 8.5	— —	0.5 0.5	**7Q7**
7S7	T+H	6K8 7J7	8BL	Loctal	Htr.	6.3	0.3	300 175	100 —	Heptode Triode		0.4 —	14 —	100 250	100 100	—2.0 —2.0	100 250*	.05 .05	0.5 1.25	500 525	8.2 10.2	1.9 1.8	3.0 3.0	3.0 5.0	.03 .04	**7S7**
12A8, G, GT	H		8A	Octal	Htr.	12.6	0.15	Same as 2A7/S																		**12A8, G, GT**
12BA7	H		8CT	Min.-9	Htr.	12.6	0.15	Same as 6BA7																		**12BA7**
12K8, GT	T+HX		8K	Octal	Htr.	12.6	0.15	300	150	125	0.75	0.7	16	100 250	100 100	—3.0 —3.0	100 100	.05 .05	0.4 0.6	325 350	12.5 12.5	2.3 2.5	6.2 6.0	3.8 3.8	0.15 0.15	**12K8, GT**
14B8	H		8X	Loctal	Htr.	12.6	0.15	Same as 7B8																		**14B8**

14J7	T+H		8BL	Loctal	Htr.	12.6	0.15	Same as 7J7																		**14J7**
14Q7	H		8AL	Loctal	Htr.	12.6	0.15	Same as 7Q7																		**14Q7**
14S7	T+H		8BL	Loctal	Htr.	12.6	0.15	Same as 7S7																		**14S7**
19X8	T+P	6X8	9AK	Min.-9	Htr.	18.9	0.15	250	250	250	1.5	0.4	—	— 150	— 150	— —3.5	150 Pentode Section	.0027	0.75	Triode Section at 250 MC 2100	—	6.2	1.8	13 Eg=2.6V	3.6	**19X8**
26D6	H		7CH	Min.-7	Htr.	26.5	0.07	300	100	—	1.0	1.0	14	100 250 20.5	100 100 26.5	—1.5 —1.5 —0.5	— — —	.020 .020 .020	0.5 1.0 —	455 475 270	— — 2.5	2.8 3.0 0.45	8.0 7.8 —	— — 1.6	— — 0.1	**26D6**

★H=Heptode. T+H=Triode and Heptode. T+HX=Triode and Hexode. T+P=Triode and Pentode. O=Octode. *Through 20,000 ohms resistance.

TABLE VI. CBS AUDIO POWER AMPLIFIERS (Triodes, Tetrodes, and Pentodes)

	DESCRIPTION			CONSTR.		CATHODE		MAXIMUM RATINGS				SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION													
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID VOLTS	TRANSCONDUCTANCE µMHOS	PEAK SIGNAL VOLTS§	PLATE MA, ZERO SIGNAL	PLATE MA, MAX. SIGNAL	SCREEN MA, ZERO SIG.	SCREEN MA, MAX. SIG.	TRIODE AMP. FACTOR	LOAD RESISTANCE●	MAX. OUTPUT WATTS	DISTORTION %	TYPE
1A5G, GT	P	1LA4 1LB4	6X	Octal	Fil.	1.4	0.05	110	110	$I_k=6.0$ma		Class A	85 90	85 90	—4.5 —4.5	800 850	4.5 4.5	3.5 4.0	3.5 4.0	0.7 0.8	1.0 1.1	— —	25K 25K	.100 .115	10.0 7.0	**1A5G, GT**
1C5G, GT	P	1S4	6X	Octal	Fil.	1.4	0.10	110	110	Zero Signal $I_k=12$ma		Class A	83 90	83 90	—7.0 —7.5	1500 1550	7.0 7.5	7.0 7.5	7.3 7.8	1.6 1.6	3.5 3.5	— —	9K 8K	.200 .240	10.0 10.0	**1C5G, GT**
1E7G, GT	P+P		8C	Octal	Fil.	2.0	0.24	135	135	1.5	0.5	Class A Class A, P-P	90 135	90 135	—3.0 —7.5	1150 —	3.0 15.0	3.8 7.0	— 10.5	1.1 2.0	— 3.5	— —	20K 24K	.110 .575	5.5 5.5	**1E7G, GT**
1F4	P	1F5G	5K	Octal	Fil.	2.0	0.12	180	180	0.75	1.75	Class A Class AB, P-P	90 135 180	90 135 180	—3.0 —4.5 —7.5	1400 1700 —	3.0 4.5 15.0	4.0 8.0 19.0	— — 21.0	1.1 2.4 5.5	— — 7.0	— — —	20K 16K 20K	.110 .310 1.25	6.0 5.0 4.5	**1F4**
1F5G	P	1F4	6X	Octal	Fil.	2.0	0.12	Same as 1F4					Same as 1F4													**1F5G**
1G5G, GT	P	1J5G	7AB	Octal	Fil.	2.0	0.12	—	—	—	—	Class A	90 135	90 135	—6.0 —13.5	1500 1550	— —	8.7 9.7	— —	3.0 3.6	— —	— —	8K 9K	.250 .550	— —	**1G5G, GT**
1G6G, GT	T+T		7AB	Octal	Fil.	1.4	0.10	110	—	$i_p=20$ma		Class A Class B, P-P	90 90	— —	0 0	675 —	— 48	1.0 2.0	— 11.0	— $I_{c1}=6$ma	—	30.0 —	12K 12K	.675 .350	— 4.0	**1G6G, GT**
1J5G	P		6X	Octal	Fil.	2.0	0.12	—	—	—	—	Class A	135	135	—16.5	1000	—	7.0	—	1.8	—	—	13.5K	.450	—	**1J5G**

1J6G, GT	T+T	19	7AB	Octal	Fil.	2.0	0.24	—	—	—	—	Class B, P-P	135	—	0	—	—	5.0	50	—	—	Pin=.17W	10K	2.1	—	**1J6G, GT**
								—	—	—	—	Class A	135	—	−3.0	—	—	3.4	—	—	—	—	10K	1.9	—	
													135	—	−6.0	—	—	0.2	—	—	—	30.0	10K	1.6	—	
1LA4/E	P		5AD	Loctal	Fil.	1.4	0.05	Same as 1A5G/GT					Same as 1A5G/GT													**1LA4/E**
1LB4	P		5AD	Loctal	Fil.	1.4	0.05	110	110	Zero Signal $I_k=6$ma		Class A	90	90	−9.0	925	9.0	5.0	—	1.0	—	—	12K	.200	10.0	**1LB4**
													45	45	−4.5	650	4.5	1.6	—	0.3	—	—	20K	.035	10.0	
1Q5G, GT	BP	1A5GT	6AF	Octal	Fil.	1.4	0.10	110	110	Zero Signal $I_k=12$ma		Class A	90	90	−4.5	2200	4.5	9.5	—	1.3	—	—	8K	.270	6.0	**1Q5G, GT**
													85	85	−5.0	1950	5.0	7.0	—	0.8	—	—	9K	.250	5.5	
1S4	P	3S4	7AV	Min.-7	Fil.	1.4	0.10	90	67.5	Zero Signal $I_k=9.0$ma		Class A	45	45	−4.5	1250	4.5	3.8	—	0.8	—	—	8K	.065	12.0	**1S4**
													67.5	67.5	−7.0	1550	7.0	7.2	—	1.5	—	—	5K	0.18	10.0	
													90	67.5	−7.0	1575	7.0	7.4	—	1.4	—	—	8K	0.27	12.0	
1T5GT	P	1C5GT 1Q5GT	6X	Octal	Fil.	1.4	0.05	110	110	Zero Signal $I_k=7.3$ma		Class A	90	90	−6.0	1150	—	6.5	6.5	0.8	1.5	—	14K	.170	7.5	**1T5GT**
1W4	P		5BZ	Min.-7	Fil.	1.4	.050	110	110	$I_k=6.0$ma $R_{g1}=1.0$ meg		Class A	45	45.0	−4.5	650	4.5	1.6	—	0.2	—	—	20K	.035	10.0	**1W4**
													67.5	67.5	−6.0	875	6.0	3.8	—	0.8	—	—	16K	.100	10.0	
													90	90	−9.0	925	9.0	5.0	—	1.0	—	—	12K	.200	10.0	
2A3	T	45	4D	Medium-4	Fil.	2.5	2.5	300	—	15	—	Class A	250	—	−45.0	5250	—	60.0	—	—	—	4.2	2.5K	3.5	5.0	**2A3**
												Class AB, P-P	300	—	−62.0	—	—	—	—	—	—	—	3K	15.0	2.5	
												Class AB, P-P	300	—	780♦	—	—	—	—	—	—	—	5K	10.0	5.0	
2A3H	T	2A3	4D	Medium-4	Htr.	2.5	2.5	Same as 2A3					Same as 2A3													**2A3H**
2A5	P		6B	Medium-6	Htr.	2.5	1.75	375	285	11.0	3.75	Class A	250	250	−16.5	2500	16.5	34.0	36.0	6.5	10.5	—	7K	3.2	8.0	**2A5**
													285	285	−20.0	2550	20.0	38.0	40.0	7.0	13.0	—	7K	4.8	9.0	

♦Cathode resistor in ohms. §Grid-to-grid voltage in push-pull operation.

†Triode connected, screen tied to plate. ♦Plate-to-plate load in push-pull operation.

P-P Push-pull operation, two tubes or both sections of double unit tubes. Values for both tubes or sections.

★Class code: BP=Beam pentode. D+P=Diode and pentode. P=Pentode. T=Triode. T+T=Duotriode. TE=Tetrode. T+P=Triode and pentode.

TABLE VI. (continued) Audio Power Amplifiers

	DESCRIPTION				CONST.			CATHODE			MAXIMUM RATINGS		SERVICE		AVERAGE CHARACTERISTICS AND TYPICAL OPERATION											
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID VOLTS	TRANSCONDUCTANCE µmhos	PEAK SIGNAL VOLTS§	PLATE MA, ZERO SIGNAL	PLATE MA, MAX. SIGNAL	SCREEN MA, ZERO SIG.	SCREEN MA, MAX. SIG.	TRIODE AMP. FACTOR	LOAD RESISTANCE♦	MAX. OUTPUT WATTS	DISTORTION %	TYPE
3B7/1291	T+T		7BE	Loctal	Fil.	1.4 2.8	0.22 0.11	180 180	I_k= 15ma I_k= 15ma	2.7 2.7	I_{c1}= 4ma I_{c1}= 2.7ma	Class AB_2, P-P Class AB_2, P-P	90 135	— —	0 0	1850 1900	23 19	10.4 18.2	21.0 22.0	I_{c1} = 3.6ma I_{c1} = 2.7ma		20 20	8K 16K	1.0 1.5	8.0 8.0	**3B7/1291**
3D6	BP		6BA	Loctal	Fil.	1.4 2.8	0.22 0.11	180	135	4.5	0.9	Class A	90 135 150	90 90 90	—4.5 —4.5 —4.5	2400 2400 2400	4.5 4.5 4.5	9.5 9.8 9.9	8.5 9.8 10.2	1.6 1.2 1.0	3.2 2.0 1.8	— — —	8K 12K 14K	.27 .50 .60	5 5 5	**3D6**
3E5	BP	3V4	6BX	Min.-7	Fil.	1.4 2.8	.05 .025	110	110	I_k=8ma		Class A Series fil.	90	90	—8.0	1100	8.0	5.5	—	1.5	—	—	8K	.175	11.0	**3E5**
3LE4	P	3LF4	6BA	Octal	Fil.	1.4 2.8	0.1 .05	— —	— —	— —	— —	Class A	90 90	90 90	—9.0 —9.0	1600 1750	— —	9.0 10.0	— —	1.8 2.0	— —	— —	6K 6K	.300 .325	— —	**3LE4**
3LF4	BP	3LE4 3V4	6BB	Octal	Fil.	1.4 2.8	0.1 .05	110	110♦	I_k=6ma		Class A Series fil.	110	110	—6.6	2000	5.1	8.5	—	1.1	—	—	8K	.330	8.5	**3LF4**
6A3	T	6A5G 6B4G	4D	Medium-4	Fil.	6.3	1.0	325	—	15	—	Class A Class AB, P-P	250 325 325	— — —	—45 —68 860♦	5250 — —	— — —	60 80 80	— — —	— — —	— — —	4.2 — —	2.5K 3K 5K	3.2 15 10	5.0 2.5 5.0	**6A3**

6A4	P	6K6GT	5B	Medium-5	Fil.	6.3 6.3	0.30 0.30	— —	— —	— —	— —	Class A	135 180	135 180	−9.0 −12.0	2100 2500	— —	13.0 22.0	— —	2.8 3.9	— —	— —	— 8K	0.7 1.5	— —	**6A4**
6A5G	T	6A3 6B4G	6T	Octal	Htr.	6.3	1.0	—	—	—	—	Class A	250	0	−45.0	5250	—	60.0	—	0	—	4.2	2.5K	3.75	—	**6A5G**
6A6	T+T	6N7GT	7B	Medium-7	Htr.	6.3	0.8	300 300	— —	1.0 5.5	— —	Class A Driver Class B, P-P	250 300 300	— — —	−5.0 0 0	3100 — —	— 58 82	6.0 35 35	— 70 70	— $I_{c1}=20$ma $I_{c1}=22$ma	—	35 — —	30K 8K 8K	— 10.0 10.0	— 4.0 8.0	**6A6**
6AB6G	T+T	6N6G	7AU	Octal	Htr.	6.3	0.50	—	—	—	—	Direct } input Coupled } output	250 250	— —	0 —	— —	— —	— —	5.0 34.0	— —	— —	— —	— 8K	— 3.5	— —	**6AB6G**
6AC5G, GT	T		6Q	Octal	Htr.	6.3	0.4	250	—	10	—	Characteristics Class B, P-P	250 250	— —	+13 0	3400 —	— 70.0	32 5.0	— —	— —	— —	125 —	$R_p=36.7$K 10K	8.0	— —	**6AC5G, GT**
6AC6GT	T+T		7AU	Octal	Htr.	6.3	1.10	—	—	—	—	Class A Driver	180	—	0	3000	—	45+7	—	—	—	54.0	4K	3.8	—	**6AC6GT**
6AD7G	T+P	6BQ6	8AY	Octal	Htr.	6.3	0.85	—	—	—	—	T Class A P Class A	250 250	— 250	25.0 16.5	325 2500	— —	4.0 34.0	— —	— 6.5	— —	6 —	— 7K	— 3.2	— —	**6AD7G**
6AG6G	P		7S	Octal	Htr.	6.3	1.25	—	—	—	—	Class A	250	250	−6.0	10000	—	30.0	—	6.0	—	—	8.4K	3.8	—	**6AG6G**
6AH5G	BP	6L6GB	6AP	Octal	Htr.	6.3	0.90	360	270	19	2.5	Class A	350	250	−18.0	5200	18.0	54.0	66.0	2.5	7.0	—	4.2K	10.8	15.0	**6AH5G**
6AK7	P	6AG7	8Y	Octal	Htr.	6.3	0.65	—	—	—	—	Class A	300	150	−3.0	11000	18.0	30.0	—	7.0	—	—	1K	3.0	—	**6AK7**
6AN5	P	6AQ5A	7BD	Min.-7	Htr.	6.3	0.45	120 300	120 300	4.2 1.7	1.4 0.56	Class A	120	120	120♦	8000	—	35.0	—	12.0	—	—	2.5K	1.3	—	**6AN5**

♦Cathode resistor in ohms.
§Grid-to-grid voltage in push-pull operation.
†Triode connected, screen tied to plate.
♣Plate-to-plate load in push-pull operation.
P-P Push-pull operation, two tubes or both sections of double unit tubes. Values for both tubes or sections.
★Class code: BP=Beam pentode. D+P=Diode and pentode. P=Pentode. T=Triode. T+T=Duotriode. TE=Tetrode. T+P=Triode and pentode.

TABLE VI. (continued) Audio Power Amplifiers

	DESCRIPTION		CONST.		CATHODE			MAXIMUM RATINGS				SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION													
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID VOLTS	TRANSCONDUCTANCE µmhos	PEAK SIGNAL VOLTS§	PLATE MA, ZERO SIGNAL	PLATE MA, MAX. SIGNAL	SCREEN MA, ZERO SIG.	SCREEN MA, MAX. SIG.	TRIODE AMP. FACTOR	LOAD RESISTANCE♦	MAX. OUTPUT WATTS	DISTORTION %	TYPE
6AR6	BP		6BQ	Octal	Htr.	6.3	1.20	565	300	19	3.2	Class A† Class A	200 250	— 250	—12.5 —22.5	6000 5400	— —	90.0 77.0	— —	— 5.0	— —	— —	— —	— —	— —	**6AR6**
6B4G	T	6A5G	5S	Octal	Same as 6A3																					**6B4G**
6B5	T+T	6AB6G	6AS	Medium-6	Htr.	6.3	0.8	—	—	—	—	Class A } input Class A } output	300 300	— —	0 —	— 2400	15 —	8.0 45.0	— —	— —	— —	— —	— 7K	— 4.0	— 5.0	**6B5**
6D5G	T		6Q	Octal	Htr.	6.3	0.7	—	—	—	—	Class A	275	—	—40	—	—	—	31.0	—	—	4.7	7.2K	1.4	—	**6D5G**
6E6	T+T		7B	Medium-7	Htr.	6.3	0.6	—	—	—	—	Class A	180 250	— —	—20.0 —27.5	— 1700	— —	— —	11.5 18.0	— —	— —	6.0 6.0	15K 14K	.75 1.6	— —	**6E6**
6F6, G, GT	P	42	7S	Octal	Htr.	6.3	0.7	375 †350	285 —	11.0 Total = 10W†	3.75	Class A Class A Class AB, P-P Class AB, P-P†	285 250 375 350	285 250 250 —	—20.0 —16.5 —26.0 —38.0	2550 2500 — —	20.0 16.5 82.0 123.0	38.0 34.0 34.0 48.0	40.0 36.0 82.0 92	7.0 6.5 5.0 —	13.0 10.5 19.5 —	— — — —	7K 7K 10K 6K	4.8 3.2 18.5 13.0	9.0 8.0 3.5 2.0	**6F6, G, GT**
6G6G	P	6K6GT	7S	Octal	Htr.	6.3	0.15	180	180	2.75	0.50	Class A Class A†	180 135 180	180 135 —	—9.0 —6.0 —12.0	2300 2100 2000	9.0 6.0 12.0	15.0 11.5 11.0	— — —	2.5 2.0 —	— — —	400 360 9.5	10K 12K 12K	1.1 0.6 0.25	10.0 7.5 5.0	**6G6G**

6N6G	T+T	6B5	7AU	Octal	Same as 6B5																					**6N6G**
6U6GT	BP		7S	Octal	Htr.	6.3	0.75	200	135	11.0	2.0	Class A	110 135 200	110 135 135	−10.5 −13.5 −14.0	5600 6200 6200	10.5 13.5 14.0	44.5 55.0 55.0	47.0 60.0 62.0	4.0 5.0 3.0	11.0 15.0 13.0	— — —	2K 2K 3K	2.0 3.3 5.5	10.0 10.0 10.0	**6U6GT**
6V5G, GT	BP		6AO	Octal	Htr.	6.3	0.45	—	—	—	—	Class A	315	225	−13.0	3750	13.0	34.0	—	6.0	—	—	8.5K	5.5	—	**6V5G, GT**
6Y7G	T+T	6N7	8B	Octal	Htr.	6.3	0.6	—	—	—	—	Class B, P-P	250	—	0	—	—	21.0	—	—	—	—	14K	8.0	—	**6Y7G**
6Z7G	T+T		8B	Small-8	Htr.	6.3	0.3	180	—	8.0	—	Class B, P-P	135 180	— —	0 0	9000 12000	— —	6.0 8.4	— —	— —	— —	— —	15K 12K	4.2 1.5	— —	**6Z7G**
7A5	BP	6Y6,G	6AA	Loctal	Htr.	6.3	0.75	125	125	5.5	1.2	Class A	110	110	−7.5	5800	7.5	40.0	41.0	3.0	7.0	—	2.5K	1.5	10.0	**7A5**
7B5	P	6K6GT 42	6AE	Loctal	Htr.	6.3	0.4	315	285	8.5	2.8	Class A	100 250 315	100 250 250	−7.0 −18.0 −21.0	1500 2300 2100	7.0 18.0 21.0	9.0 32.0 25.5	9.5 33.0 28.0	1.6 5.5 4.0	3.0 10.0 9.0	— — —	12K 7.6K 9K	.35 3.4 4.5	11.0 11.0 15.0	**7B5**
7C5	BP	6V6GT	6AA	Loctal	Htr.	6.3	0.45	315	285	12.0	2.0	Class A	180 250 315	180 250 225	−8.5 −12.5 −13.0	3700 4100 3750	8.5 12.5 13.0	29.0 45.0 34.0	30.0 47.0 35.0	3.0 4.5 2.2	4.0 7.0 6.0	— — —	5.5K 5K 8.5K	2.0 4.5 5.5	8.0 8.0 12.0	**7C5**
10	T		4D	Medium-4	Fil.	7.5	1.25	—	—	—	—	Class A	350 425	— —	−32.0 −40.0	1550 1600	— 35	16.0 18.0	— —	— —	— —	8.0 8.0	11K 10.2K	0.9 1.6	— —	**10**
12A/112A	T		4D	Medium-4	Fil.	5.0	0.25	—	—	—	—	Class A	90 135	— —	−4.5 −9.0	1600 1700	— —	5.0 6.2	— —	— —	— —	8.5 8.5	5.4K 5.1K	.035 .13	— —	**12A/112A**
12A5	P		7F	Small-7	Htr.	6.3 12.6	0.6 0.3	— —	— —	— —	— —	Class A	100 180	100 180	−15.0 −25.0	1700 2400	— —	17.0 45.0	— —	3.0 8.0	— —	— —	4.5K 3.3K	0.8 3.4	— —	**12A5**

♦Cathode resistor in ohms.
†Triode connected, screen tied to plate.
§Grid-to-grid voltage in push-pull operation.
♣Plate-to-plate load in push-pull operation.
P-P Push-pull operation, two tubes or both sections of double unit tubes. Values for both tubes or sections.
★Class code: BP=Beam pentode. D+P=Diode and pentode. P=Pentode. T=Triode. T+T=Duotriode. TE=Tetrode. T+P=Triode and pentode.

TABLE VI. (continued) Audio Power Amplifiers

	DESCRIPTION		CONSTR.		CATHODE			MAX RATINGS				SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION													
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID VOLTS	TRANSCONDUCTANCE µMHOS	PEAK SIGNAL VOLTS§	PLATE MA, ZERO SIGNAL	PLATE MA, MAX. SIGNAL	SCREEN MA, ZERO SIG.	SCREEN MA, MAX. SIG.	TRIODE AMP. FACTOR	LOAD RESISTANCE♦	MAX. OUTPUT WATTS	DISTORTION %	TYPE
12A6, GT	BP	14A5	7S	Octal	Htr.	12.6	0.15	—	—	—	—	Class A	250	250	—12.5	3000	—	30.0	—	3.5	—	—	7.5K	2.5	—	**12A6, GT**
12A7	D+P		7K	Octal	Htr.	12.6	0.3	—	—	—	—	H-W Rectifier Class A	A-C Volts per plate (RMS) = 125 Max. 135	135	—13.5	975	—	9.0	—	D-C output current = 30 ma Max. 2.5	—	100	13.5K	0.55	—	**12A7**
12CS5	BP	12W6GT	9CK	Octal	Htr.	12.6	0.6	300	150	10	1.25	Class A	110 200 †225	110 125 —	—7.5 180♦ —30	8000 8000 3800	7.5 8.5 —	49.0 46.0 22.0	50.0 47.0 (G_1 Volts for I_b = 0.5 ma = —42)	4.0 2.2	10.0 8.5	— — 6.2	2K 4K R_a = 1.5K	2.1 3.8	10 10 —	**12CS5**
12L8GT	P+P		8BU	Octal	Htr.	12.6	0.15	—	—	—	—	Class A	110 180	110 180	—5.5 —9.0	1680 2150	— —	6.1 13.0	— —	1.3 2.8	— —	— —	14K 10K	.3 1.0	— —	**12L8GT**
14A5	BP	12A6GT	6AA	Loctal	Htr.	12.6	0.15	300	300	7.5	1.5	Class A	250	250	—12.5	3000	12.5	30.0	32.0	3.5	5.5	—	7.5K	2.8	7	**14A5**
14C5	BP	12V6	6AA	Loctal	Htr.	12.6	0.225	—	Same as 7C5																	**14C5**
18	P	12V6	6B	Medium-6	Htr.	14.0	0.3	—	Same as 6F6G/6F6GT																	**18**
19	T+T	1J6GT	6C	Octal	Fil.	2.0	0.26	—	Same as 1J6G/1J6GT																	**19**

20	T		4D	Small-4	Fil.	3.3	0.132	—	—	—	—	Class A	90 135	— —	—16.5 —22.5	450 600	— —	2.8 6.0	— —	— —	— —	3.5 3.5	9.6K 6.5K	.05 .13	— —	**20**
25A6, G, GT	P		7S	Octal	Htr.	25.0	0.3	160	135	5.3	1.9	Class A	95 160	95 120	—15.0 —18.0	2000 2375	— —	20.0 33.0	— —	4.0 6.5	— —	— —	4.5K 5K	0.9 2.2	— —	**25A6, G, GT**
25A7GT	D+P	32L7GT	8F	Octal	Htr.	25.0	0.3	117	117	2.25	0.8	H-W Rectifier Class A	A-C plate volts (RMS) = 117 100	100	—15.0	1800	—	D-C output = 75 ma 20.5	—	4.0	—	—	4.5K	0.77	9	**25A7GT**
25AC5GT	T		6Q	Octal	Htr.	25.0	0.3	180	—	10	—	Class A 6AE5GT Driver	110 6AE5GT R_g = 1.0 meg	—	+15.0	3800	I_{c1} = 22	45.0 7.0	— 6AE5GT characteristics direct coupled to 25AC5GT	—	—	58	2K	2.0	10	**25AC5GT**
25B5	T+T	25N6	6D	Octal	Htr.	25.0	0.3	—	—	—	—	Direct } input Coupled } output	110 110	— —	0 —	2300 —	— —	7.0 45	— —	— —	— —	— —	— 2K	— 2.0	— 10	**25B5**
25B6G	P	25W6	7S	Octal	Htr.	25.0	0.3	—	—	—	—	Class A	105 200	105 135	—16.0 —23.0	4800 5000	— —	48.0 62.0	— —	2.0 1.8	— —	— —	1.7K 2.5K	2.4 7.1	— —	**25B6G**
25C6G	BP		7S	Octal	Htr.	25.0	0.3	200	135	12.5	1.75	Class A	135 200	135 135	—13.5 —14.0	7000 7100	13.5 14.0	58.0 61.0	60.0 66.0	3.5 2.2	11.5 9.0	— —	2K 2.6K	3.6 6.0	10 10	**25C6G**
25N6	T+T	25B5	7W	Octal	Htr.	25.0	0.3	—	Same as 25B5																	**25N6**
25W6GT	BP		7AC	Octal	Htr.	25.0	0.3	300	150	10.0	1.25	Class A	110 200	110 125	—7.5 180♦	8000 8000	7.5 8.5	49.0 46.0	50.0 47.0	4.0 2.2	10.8 8.5	— —	2K 4K	2.1 3.8	10 10	**25W6GT**
26A7	BP		8BU	Octal	Htr.	26.5	0.6	50	50	2	0.5	Class A Class AB, P-P	26.5 26.5	26.5 26.5	—4.5 —7.0	5700 —	4.5 14	20.0 19.0	20.5 30.0	1.9 2.0	5.5 8.5	— —	1.5K 2.5K	0.2 0.5	7 5	**26A7**

♦Cathode resistor in ohms.
†Triode connected, screen tied to plate.
§Grid-to-grid voltage in push-pull operation.
♠Plate-to-plate load in push-pull operation.
P-P Push-pull operation, two tubes or both sections of double unit tubes. Values for both tubes or sections.
★Class code: BP=Beam pentode. D+P=Diode and pentode. P=Pentode. T=Triode. T+T=Duotriode. TE=Tetrode. T+P=Triode and pentode.

TABLE VI. (continued) Audio Power Amplifiers

	DESCRIPTION		CONSTR		CATHODE			MAXIMUM RATINGS				SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION													
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID VOLTS	TRANSCONDUCTANCE µmhos	PEAK SIGNAL VOLTS§	PLATE MA, ZERO SIGNAL	PLATE MA, MAX. SIGNAL	SCREEN MA, ZERO SIG.	SCREEN MA, MAX. SIG.	TRIODE AMP. FACTOR	LOAD RESISTANCE‡	MAX. OUTPUT WATTS	DISTORTION %	TYPE
31	T		4D	Medium-4	Fil.	2.0	0.13	—	—	—	—	Class A	135 180	— —	—22.5 —30.0	925 1050	— —	8.0 12.3	— —	— —	— —	3.8 3.8	7K 5.7K	.185 .375	— —	31
32L7GT	D + BP	25A7GT	8Z	Octal	Htr.	32.5	0.3	—	—	—	—	Class A H-W Rectifier	90	90 Plate volts = 125, RMS	—5.0	4800	—	27.0	—	2.0 Output current = 60 ma	—	—	2.6K	1.0	—	32L7GT
33	P	950	5K	Medium-5	Htr.	2.0	0.26	180	180	—	—	Class A	135 180	135 180	—13.5 —18.0	1450 1700	— —	14.5 22.0	— —	3.0 5.0	— —	70 90	7K 6K	0.7 1.4	7 7	33
35A5	BP		6AA	Loctal	Htr.	35.0	0.15	200	117	8.5	1.0	Class A	110 200	110 110	7.5 —8.0	5800 5900	7.5 8.0	40.0 41.0	41.0 44.0	3.0 2.0	7.0 7.0	— —	2.5K 4.5K	1.5 3.3	10 10	35A5
38	P		5F	Small-5	Htr.	6.3	0.3	250	250	—	—	Class A	100 250	100 250	—9.0 —25.0	875 1200	— —	7.0 22.0	— —	1.2 3.8	— —	120 120	15K 10K	0.27 2.5	8 8	38
41	P	6K6GT	6B	Medium-6	Htr.	6.3	0.4	Same as 7B5																		41
42	P	6F6GT	6B	Medium-6	Htr.	6.3	0.7	Same as 6F6G																		42
43	P	25A6GT	6B	Medium-6	Htr.	25	0.3	Same as 25A6																		43

45	T		4D	Medium-4	Fil.	2.5	1.5	275	—	—	—	Class A Class AB, P-P	180 250 275 275	— — — —	—31.5 —50.0 —56.0 —68.0	2125 2175 2050 —	— — — —	31.0 34.0 36.0 28.0	— — — 138.0	— — — —	— — — —	3.5 3.5 3.5 —	2.7K 3.9K 4.6K 3.2K	0.825 1.6 2.0 18.0	— — — 5	**45**
45A	T		4D	Medium-4	Fil.	2.5	1.5	—	—	—	—	Class A	325	—	—68.0	2370	—	43.0	—	—	—	3.5	3.2K	3.0	—	**45A**
46	TE		5C	Medium-5	Fil.	2.5	1.75	400	—	10	—	Class A Class B, P-P	250 300	G_2 to P G_1 to G_2	—33 0	2350 —	— —	22.0 8.0	— —	— —	— —	5.6 —	6.4K 5.2K	1.25 16.0	— —	**46**
47	P	2A5	5B	Medium-5	Fil.	2.5	1.75	250	—	—	—	Class A	250	250	—16.5	2500	—	31.0	—	6.0	—	150	7K	2.7	6	**47**
48	TE		6A	Medium-5	Htr.	30.0	0.4	—	—	—	—	Class A	95 125	95 100	—20.0 —22.5	3900 3900	— —	52.0 52.0	— —	12.0 12.0	— —	15.6 43	1.5K 1.5K	2.0 3.0	— —	**48**
49	Duo grid T		5C	Medium-5	Fil.	2.0	0.12	—	—	—	—	Class A Class B, P-P	135 135 180	G_2 to P — —	—20.0 0 0	1125 — —	— 70 70	6.0 2.6 4.0	— — —	— — —	— — —	4.7 — —	11K 8K 12K	0.170 2.3 3.5	— — —	**49**
50	T		4D	Medium-4	Fil.	7.5	1.25	—	—	—	—	Class A	300 350 400 450	— — — —	—54.0 —63.0 —70.0 —84.0	1900 2000 2100 2100	— — — —	35.0 45.0 55.0 55.0	— — — —	— — — —	— — — —	3.8 3.8 3.8 3.8	4.6K 4.1K 3.67K 4.35K	1.6 2.4 3.4 4.6	— — — —	**50**
50A5	BP	50B5	6AA	Loctal	Htr.	50.0	0.15	200	117	10	1.25	Class A	110 200	110 110	—7.5 —8.0	— —	7.5 8.0	49.0 50.0	50.0 55.0	4.0 1.5	11.0 6.0	— —	2K 3K	2.2 4.7	10 10	**50A5**
50C6G	BP		7AC	Octal	Htr.	50.0	0.15	200	135	12.5	1.75	Class A	135 200	135 135	—13.5 —14.0	7000 7100	13.5 14.0	58.0 61.0	60.0 66.0	3.5 2.2	11.5 9.0	— —	2K 2.6K	3.6 6.0	10 10	**50C6G**

♦Cathode resistor in ohms.
†Triode connected, screen tied to plate.
§Grid-to-grid voltage in push-pull operation.
♠Plate-to-plate load in push-pull operation.
P-P Push-pull operation, two tubes or both sections of double tubes. Values for both tubes or sections.
★Class code: BP=Beam pentode. D+P=Diode and pentode. P=Pentode. T=Triode. T+T=Duotriode. TE=Tetrode. T+P=Triode and pentode.

TABLE VI. (continued) Audio Power Amplifiers

	DESCRIPTION				CONSTR.	CATHODE		MAX RATINGS				SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION													
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID VOLTS	TRANSCONDUCTANCE µmhos	PEAK SIGNAL VOLTS§	PLATE MA, ZERO SIGNAL	PLATE MA, MAX. SIGNAL	SCREEN MA, ZERO SIG.	SCREEN MA, MAX. SIG.	TRIODE AMP. FACTOR	LOAD RESISTANCE♦	MAX. OUTPUT WATTS	DISTORTION %	TYPE
52	Duo grid T		5C	Medium-5	Fil.	6.3	0.3	300	—	5.5	—	Class A Class B, P-P.	110 180	G_2 to P G_1 to G_2	0 0	3000 —	— —	43.0 3.0	— —	— —	— —	5.2 —	2K 10K	1.5 5.0	— —	**52**
53	T+T		7B	Medium-7	Htr.	2.5	2.0	300	—	5.5	—	Same as 6A6														**53**
59	P	47 2A5	7A	Medium-7	Htr.	2.5	2.0	—	—	—	—	Class A Class B†	P250 300 400	250 G_2 to G_1 & G_3 to P	—18.0 0 0	2500 — —	— — —	35.0 26.0 26.0	— — —	9.0 — —	— — —	— — —	6K 4.6K 6K	3.0 15.0 20.0	— — —	**59**
68, A	P		5E	Medium-5	Htr.	6.3	0.4	—	—	—	—	Class A	135	90	—13.5	1400	—	14.0	—	3.0	—	—	7.5K	0.65	—	**68, A**
70A7GT	D+BP	70L7GT	8AB	Octal	Htr.	70.0	0.15	—	—	—	—	Class A H-W Rectifier	110	110 Plate volts = 125 RMS	—7.5	5800	—	40.0	—	3.0	— Output current = 60 ma	—	2.5K	1.5	—	**70A7GT**
70L7GT	D+BP	70A7GT	8AA	Octal	Htr.	70.0	0.15	117	117	5.0	1.0	Class A H-W Rectifier	110 Plate Volts = 117 RMS	110	—7.5	7500 Output current = 70 ma	—	40.0	—	3.0	—	— Capacitor input to filter	2K	1.8	—	**70L7GT**
71	T		4D	Medium-4	Fil.	5.0	0.25	—	—	—	—	Class A	180	—	—40.5	1700	—	20.0	—	—	—	3.0	4.8K	0.79	5	**71**
71A	T		4D	Medium-4	Fil.	5.0	0.25	—	—	—	—	Class A	90 135 180	— — —	—16.5 —27.0 —40.5	1400 1650 1700	— — —	10.0 17.3 20.0	— — —	— — —	— — —	3.0 3.0 3.0	3K 3K 4.8K	0.125 0.4 0.79	5 5 5	**71A**

71B	T		4D	Medium-4	Fil.	5.0	0.25	—	—	—	—	Same as 71A														**71B**
79	T+T	6A6	6H	Small-6	Htr.	6.3	0.6	250	—	11.5	—	Class B, P-P	180 250	— —	0 0	— —	— —	7.6 10.6	Pin = .38W Pin = .38W				7K 14K	5.5 8.0	— —	**79**
89/89Y	P		6F	Small-6	Htr.	6.3	0.4	250	250	—	—	Class A Class A Class B, P-P	250 250 180	— 250 —	—31.0 —25.0 0	1800 1800 —	— — —	32.0 32.0 6.0	G₂ & G₃ tied to P G₃toK G₃toP	 — —	 — —	4.7 125 —	5.5K 6.75K 9.4K	0.9 3.4 3.5	5 9 —	**89/89Y**
95	P		6B	Medium-6	Htr.	2.5	1.75	—	—	—	—	Class A	315	315	—22.0	2300	—	42.0	—	8.0	—	—	7K	5.0	—	**95**
117L7/GT	D+BP	117N7GT 117P7GT	8AO	Octal	Htr.	117	0.09	117	117	6.0	1.0	Class A H-W Rectifier	105 Plate Volts = 117 RMS	105	—5.2	5300	5.2 Output current = 75 ma	43.0	43.0	4.0	5.5	— Capacitor input to filter	4K	0.85	5	**117L7/GT**
117N7GT	D+BP	117P7GT	8AV	Octal	Htr.	117	0.09	117	117	5.5	1.0	Class A H-W Rectifier	100 Plate Volts = 117 RMS	100	—6.0	7000	6.0 Output current = 75 ma	51.0	—	5.0	— Plate supply impedance = 15 Ω	—	3K	1.2	6	**117N7GT**
117P7GT	D+BP	117L7GT	8AV	Octal	Htr.	117	0.09	Same as 117L7/M7GT																		**117P7GT**
182B/482B	T	71A 183/483	4D	Medium-4	Fil.	5.0	1.25	—	—	—	—	Class A	250	—	—35.0	2000	—	20.0	—	—	—	5.0	4.5K	1.35	—	**182B/482B**
183/483	T		4D	Medium-4	Fil.	5.0	1.25	—	—	—	—	Class A	250	—	—65.0	1500	—	20.0	—	—	—	3.0	4.5K	1.8	—	**183/483**
210T	T	10	4D	Medium-4	Fil.	7.5	1.25	Same as 10																		**210T**
950	P	33	5K	Medium-5	Fil.	2.0	0.125	—	—	—	—	Class A	135	135	—16.5	1000	—	7.0	—	2.0	—	125	13.5K	0.575	—	**950**

♦Cathode resistor in ohms. §Grid-to-grid voltage in push-pull operation.
†Triode connected, screen tied to plate. ♠Plate-to-plate load in push-pull operation.
P-P Push-pull operation, two tubes or both sections of double unit tubes. Values for both tubes or sections.
★Class code: BP=Beam pentode. D+P=Diode and pentode. P=Pentode. T=Triode. T+T=Duotriode. TE=Tetrode. T+P=Triode and pentode.

TABLE VII. CBS TV DEFLECTION POWER AMPLIFIERS (Power Triodes, Tetrodes, and Pentodes)

	DESCRIPTION		CONSTR.		CATHODE			MAXIMUM RATINGS									SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION							
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	PLATE SUPPLY VOLTS	PEAK POS. PLATE VOLTS*	PEAK NEG. PLATE VOLTS	PEAK GRID VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	AVERAGE CATHODE MA	PEAK CATHODE MA	APPLICATION	PLATE VOLTS	SCREEN VOLTS	GRID VOLTS	TRANSCONDUCTANCE µMHOS	PLATE MA	SCREEN MA	PLATE RES., OHMS	TYPE
6BD5GT	BP	6BQ6GTA	6CK	Octal	Htr.	6.3	0.9	325	4000	—	—200	325	10	3	100	300	Class A Amp. Horiz. Amp.	200 310	200 310	—12.0	5000	Cathode Current=90 ma Peak surge e_g = —50V peak E_b = 2500V			**6BD5GT**
6BN7	T+T		9AJ	Min.-9	Htr.	6.3	0.75	400†	1500□	—	—50†	—	7.5□ 1.5■	—	— —	— —	Class A Amp.□ Class A Amp.■ Vert. Amp.□ Vert. Osc.■	250 120 360 360	— — — —	—15.0 —1.0 —15pk —	5500 2000 — —	24 5.0 21 .2	— — RK=330 ohms —	2200 14000 —	**6BN7**
12A4	TE	12BH7 12AU7	9AG	Min.-9	Htr.	12.6 6.3	0.3 0.6	450 450	— 1000	— —	— —250	— —	6.0 5.9	— —	40 30	— 105	Class A Amp. Vert. Amp.	250 —	— —	—9.0 —	8000 —	12.5 —	— —	2500 —	**12A4**

†Each section *Absolute Maximum

□Section 1

■Section 2

★T+T=Double Triode. TE=Tetrode. BP=Beam Pentode.

TABLE VIII. CBS — INDICATORS (Tuning Eyes)

	DESCRIPTION			CONSTR.		CATHODE		MAXIMUM RATINGS			AVERAGE CHARACTERISTICS AND TYPICAL OPERATION							
								TARGET VOLTS										
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	MAXIMUM	MINIMUM	ANODE VOLTS	SUPPLY VOLTS	TARGET VOLTS	ANODE MA (ZERO BIAS)	TARGET MA (ZERO BIAS)	SERIES ANODE RESISTOR, MEG.	GRID VOLTS (OPEN)	GRID VOLTS (CLOSED)	TYPE
2E5	T	2G5	6R	Small-6	Htr.	2.5	0.8	250	125	250	200 250	200 250	0.19† 0.24†	3.0† 4.0†	1.0 1.0	0 0	—6.5 —8.0	**2E5**
2G5	T	2E5	6R	Small-6	Htr.	2.5	0.8	250	100	250	100 200 250	100 200 250	0.19 0.19 0.24	1.0† 3.0† 4.0†	0.5 1.0 1.0	0 0 0	—8.0 —18.5 —22.0	**2G5**
6AB5/6N5	T		6R	Small-6	Htr.	6.3	0.15	180	100	180	135	135	0.5†	2.0†	0.25	0	—10	**6AB5/6N5**
6AD6G	T		7AG	Octal	Htr.	6.3	0.15	—	—	—	100 150	100 150	— —	3.0† 3.0†	— —	23 50	45 75	**6AD6G**
6AF6G	T		7AG	Octal	Htr.	6.3	0.15	250	125	250	100 135 250	100 135 250	— — —	— — 2.2†	— — —	0 0 0	60 81 155	**6AF6G**
6E5	T	6T5 6U5/6G5	6R	Small-6	Htr.	6.3	0.3	250	125	250	200 250	200 250	0.19 0.24	3.0† 4.0†	1.0 1.0	0 0	—6.5 —8.0	**6E5**
6G5/6H5	T	6U5/6G5	6R	Small-6	Htr.	6.3	0.3	—	—	—	250 100	250 100	0.24 0.19	4.0 1.0	1.0 0.5	0 0	—22.0 —8.0	**6G5/6H5**

TABLE VIII. (continued) INDICATORS

DESCRIPTION			CONST.		CATHODE			MAXIMUM RATINGS			AVERAGE CHARACTERISTICS AND TYPICAL OPERATION							
								TARGET VOLTS										
TYPE	CLASS★	NEAREST EQUIVALENT	BASING	BASE & PINS	HTR./FIL.	VOLTS	AMPERES	MAXIMUM	MINIMUM	CONTROL ELECTRODE VOLTS	SUPPLY VOLTS	TARGET VOLTS	ANODE MA (ZERO BIAS)	TARGET MA (ZERO BIAS)	SERIES ANODE RESISTOR, MEG.	GRID VOLTS (OPEN)	GRID VOLTS (CLOSED)	TYPE
6H5	T	6U5/6G5	6R	Small-6	Htr.	6.3	0.3	Same as 6G5/6H5										**6H5**
6T5	T	6U5/6G5	6R	Small-6	Htr.	6.3	0.3	Same as 6G5/6H5										**6T5**
6U5	T	6E5	6R	Small-6	Htr.	6.3	0.2	Same as 6G5/6H5										**6U5**

★T = Triode.

†Subject to wide variations.

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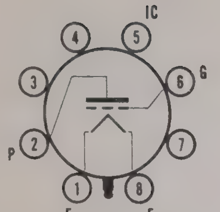
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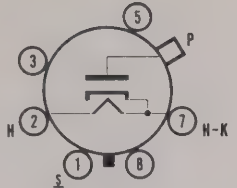
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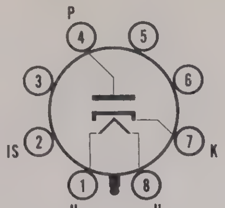
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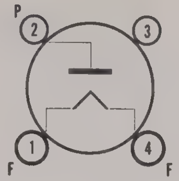

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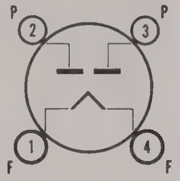

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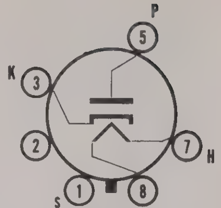
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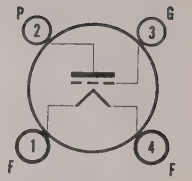

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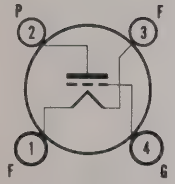

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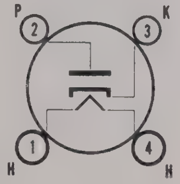

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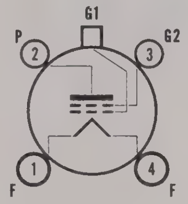
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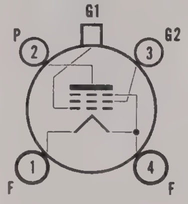
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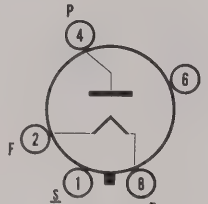
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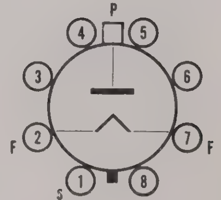
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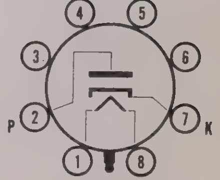
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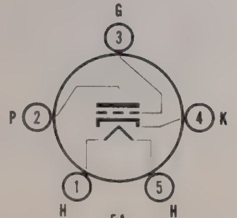
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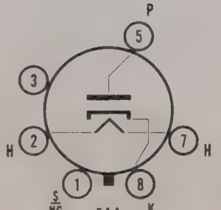
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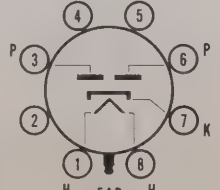
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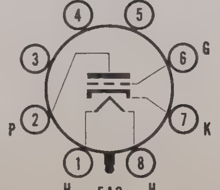
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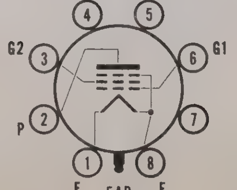
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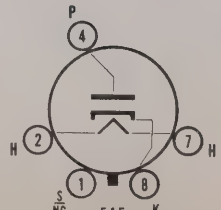
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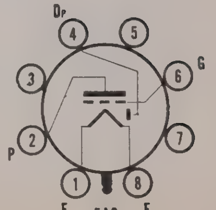
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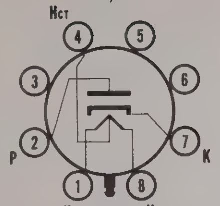
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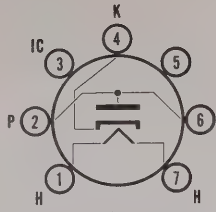
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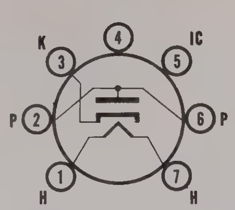
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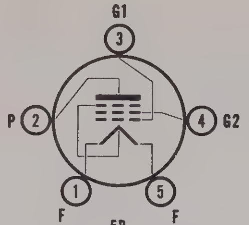
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G2
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F

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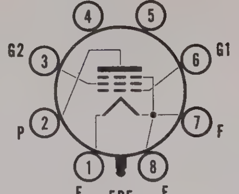
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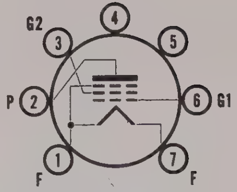
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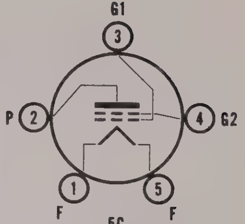
5BZ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F

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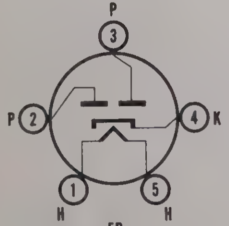
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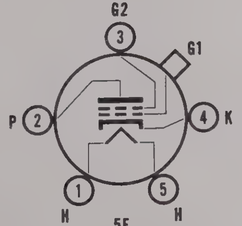
5D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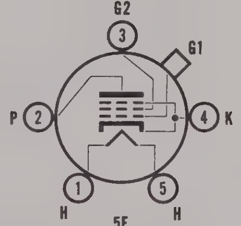
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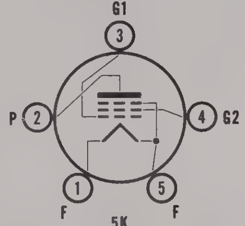
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F

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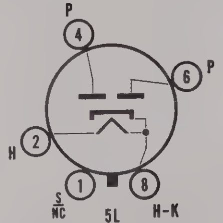
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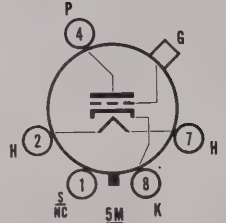
5L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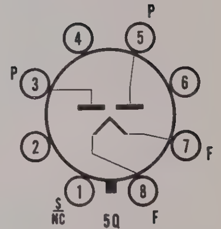
K

5M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F

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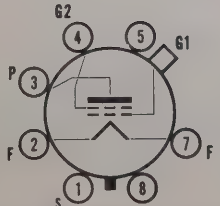
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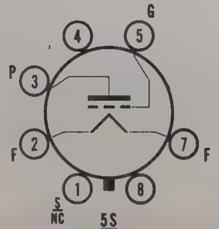
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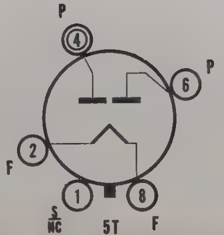
NC

5S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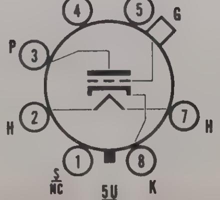
F

5T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1
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S
NC
K

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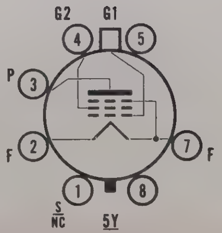
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F
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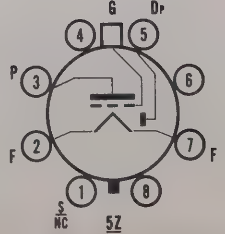
8
S
NC

5Y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S
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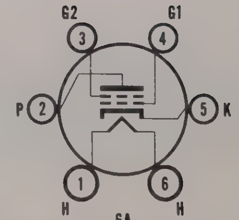
G2
G1
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P
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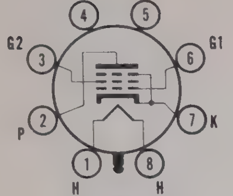
1
6
H
H

6A

BASING DIAGRAMS FOR SELDOM-USED TUBE REFERENCE GUIDE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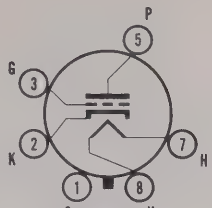
8
H
H

6AA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1
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S
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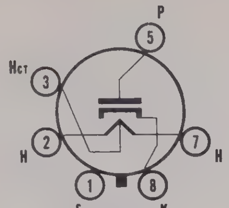
H

6AB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Hct
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H
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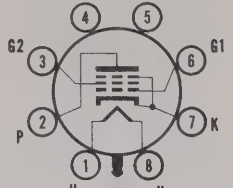
7
H
1
8
S
NC
K

6AD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G2
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G1
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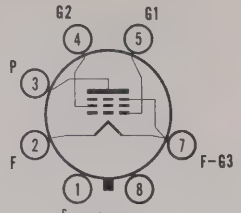
8
H
H

6AE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G1
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P
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F
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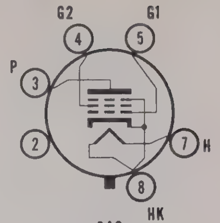
7
F-G3
1
8
S
NC

6AF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2
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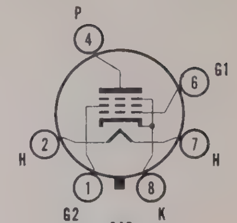
H
8
HK

6AO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G1
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2
7
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1
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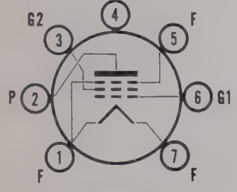
G2
K

6AP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G1
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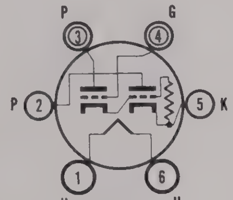
F
7
F

6AR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2
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K
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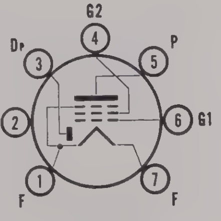
H
6
H

6AS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2
6
G1
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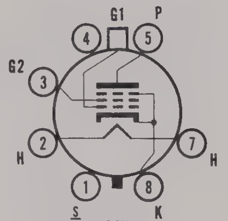
F
7
F

6AU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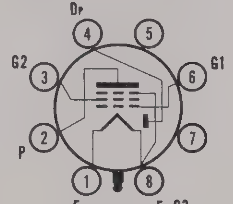
G2
3
H
2
7
H
1
8
S
NC
K

6AW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G1
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1
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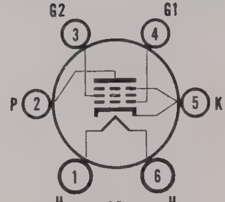
F
F-G3

6AX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G1
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P
2
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K
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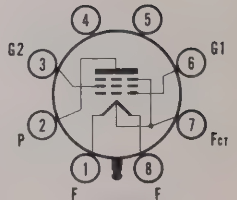
6
H
H

6B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Fct
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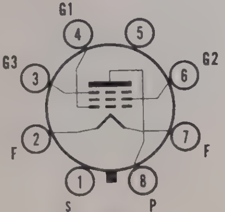
8
F
F

6BA-6BB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7
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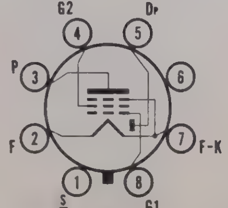
8
S
NC
P

6BD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P
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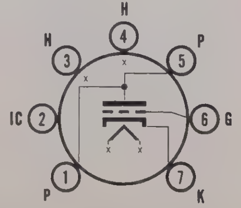
F-K
1
8
S
NC
G1

6BE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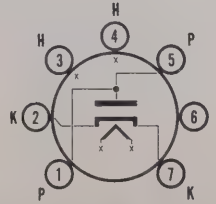
P
7
K

6BG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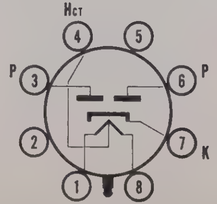
1
P
7
K

6BH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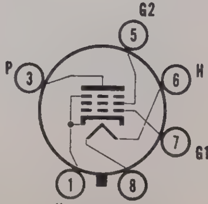
8
H
H

6BJ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7
G1
1
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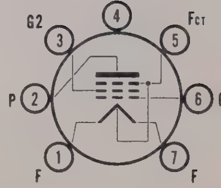
K
H

6BQ


4
G2
3
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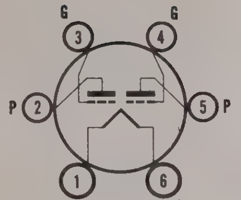
Fct
P
2
6
G1
1
F
7
F

6BX

BASING DIAGRAMS FOR SELDOM-USED TUBE REFERENCE GUIDE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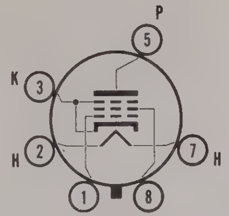
G
P
P
F
F
1 2 3 4 5 6
6C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H
H
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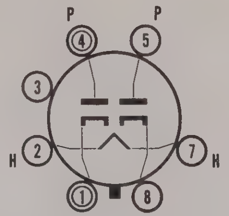
G2
1 2 3 5 7 8
6CK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H
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K
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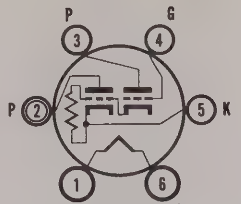
6CN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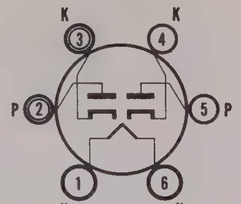
P
K
H
H
1 2 3 4 5 6
6D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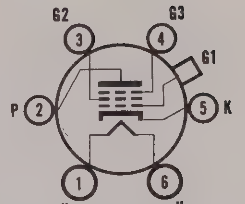
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H
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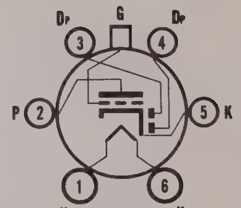
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Dp
P
K
H
H
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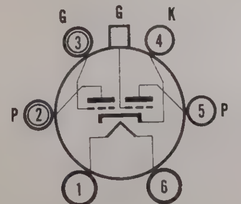
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P
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H
H
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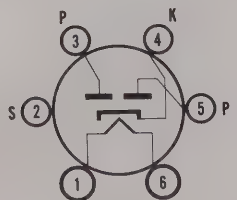
6H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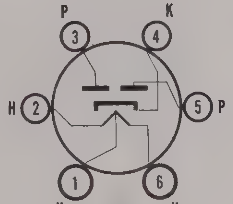
S
P
H
H
1 2 3 4 5 6
6J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P
Hct
H
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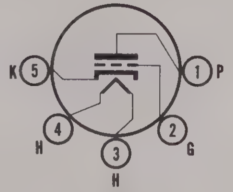
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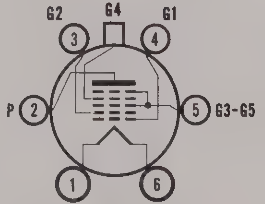
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G1
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G3-G5
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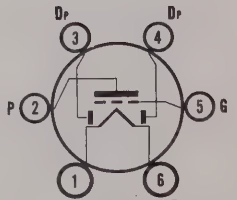
1 2 3 4 5 6
6L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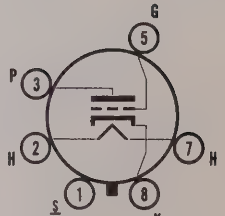
F
F
1 2 3 4 5 6
6M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H
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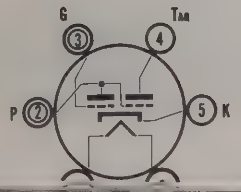
6Q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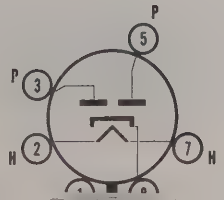
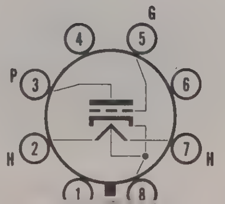
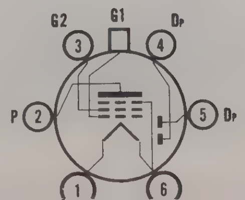
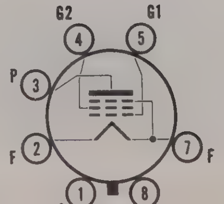
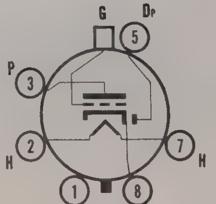
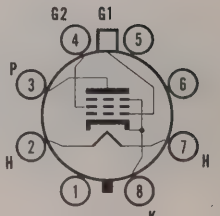



G
P
H
H
1 2 3 4 5 6 7 8

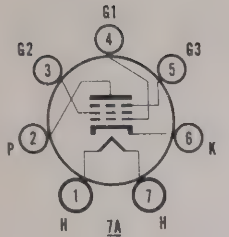

G2
G1
Dp
P
Dp
1 2 3 4 5 6


G2
G1
P
F
F
1 2 3 4 5 7 8

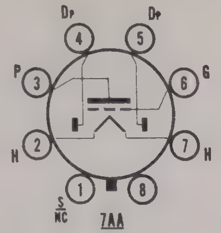

G
Dp
P
H
H
1 2 3 5 7 8


G2
G1
P
H
H
K
1 2 3 4 5 6 7 8

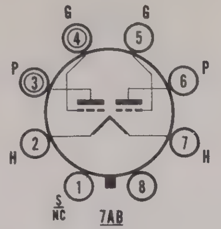
BASING DIAGRAMS FOR SELDOM-USED TUBE REFERENCE GUIDE


G1
4
G2
3
G3
5
P
2
6
K
1
7
H
H

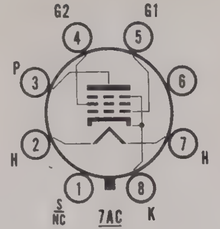
7A


Dp
Dp
4
5
P
3
6
G
H
2
7
H
S
NC
1
8

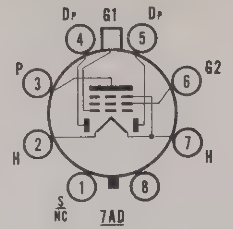
7AA


G
G
4
5
P
3
6
P
H
2
7
H
S
NC
1
8

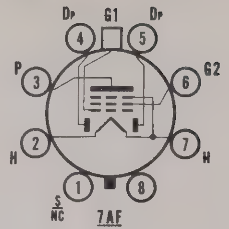
7AB


G2
G1
4
5
P
3
6
H
2
7
H
S
NC
1
8
K

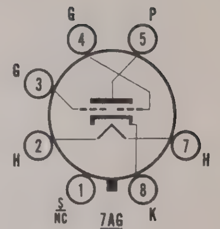
7AC


Dp
G1
Dp
4
5
P
3
6
G2
H
2
7
H
S
NC
1
8

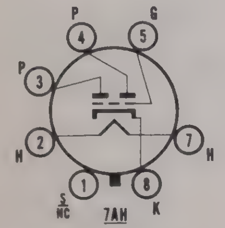
7AD


Dp
G1
Dp
4
5
P
3
6
G2
H
2
7
H
S
NC
1
8

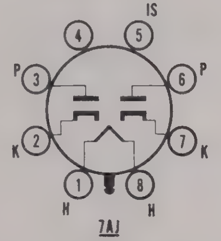
7AF


G
P
4
5
G
3
H
2
7
H
S
NC
1
8
K

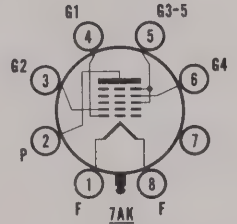
7AG


P
G
4
5
P
3
H
2
7
H
S
NC
1
8
K

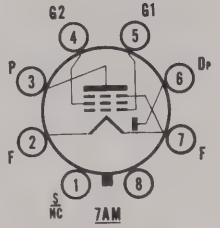
7AH


IS
4
5
P
3
6
P
K
2
7
K
1
8
H
H

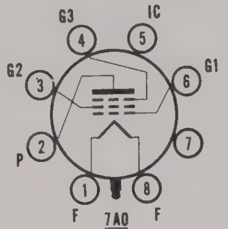
7AJ


G1
G3-5
4
5
G2
3
6
G4
P
2
7
1
8
F
F

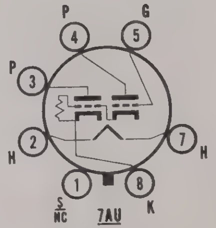
7AK


G2
G1
4
5
P
3
6
Dp
F
2
7
F
S
NC
1
8

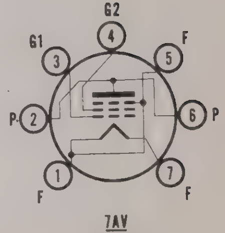
7AM


G3
IC
4
5
G2
3
6
G1
P
2
7
1
8
F
F

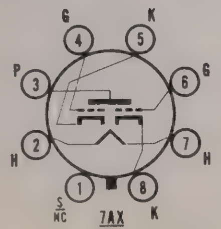
7AO


P
G
4
5
P
3
H
2
7
H
S
NC
1
8
K

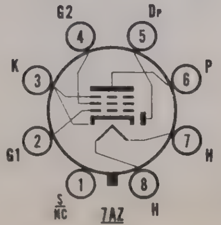
7AU


G2
4
G1
3
F
5
P
2
6
P
1
7
F
F

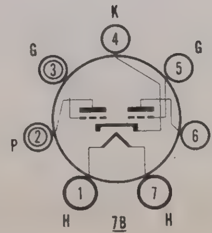
7AV


G
K
4
5
P
3
6
G
H
2
7
H
S
NC
1
8
K

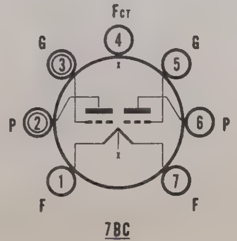
7AX


G2
Dp
4
5
K
3
6
P
G1
2
7
H
S
NC
1
8
H

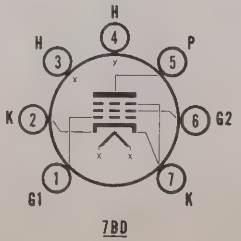
7AZ


K
4
G
3
G
5
P
2
6
P
1
7
H
H

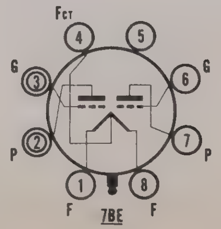
7B


FCT
4
G
3
G
5
x
P
2
6
P
x
1
7
F
F

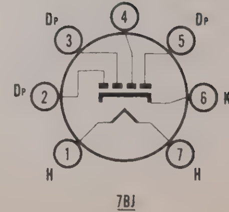
7BC


H
4
H
3
5
P
y
x
K
2
6
G2
x
x
1
7
G1
K

7BD

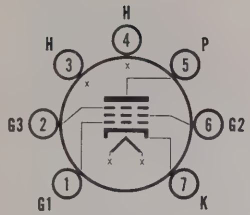

FCT
4
5
G
3
6
G
P
2
7
P
1
8
F
F

7BE

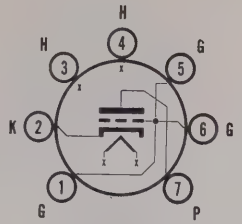

Dp
4
Dp
3
Dp
5
Dp
2
6
K
1
7
H
H

7BJ

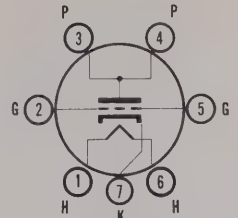
BASING DIAGRAMS FOR SELDOM-USED TUBE REFERENCE GUIDE


H
H
P
G3
G2
G1
K

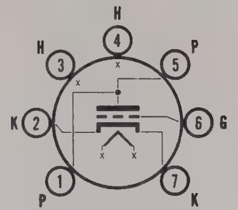
7BK



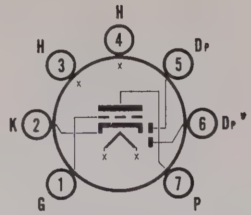
7BQ



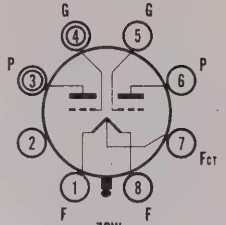
7BR



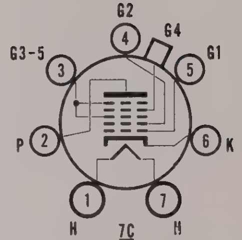
7BS



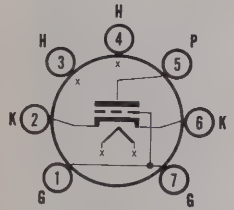
7BT



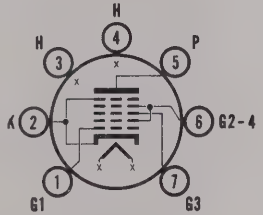
7BW


G2
G4
G3-5
G1
P
K
H
H

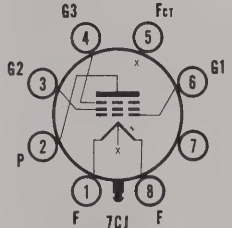
7C



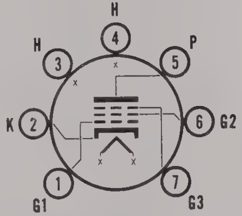
7CA


H
H
P
K
G2-4
G1
G3

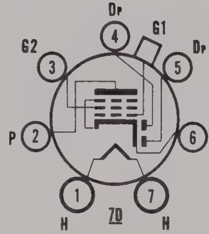
7CH


G3
Fct
G2
G1
P
F
F

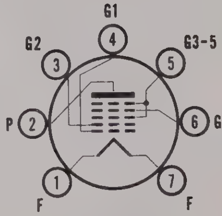
7CJ


H
H
P
K
G2
G1
G3

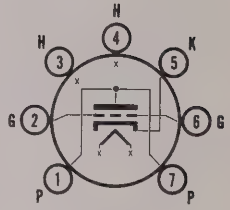
7CM


Dp
G1
G2
Dp
P
K
H
H

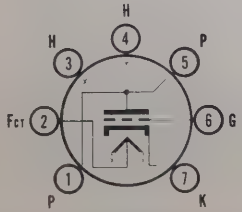
7D


G1
G2
G3-5
P
G4
F
F

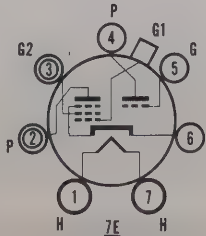
7DC



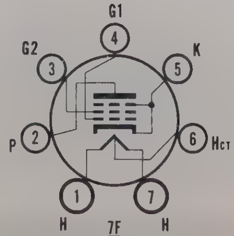
7DK



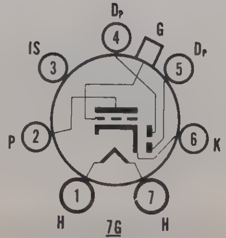
7DW


P
G1
G2
G
P
K
H
H

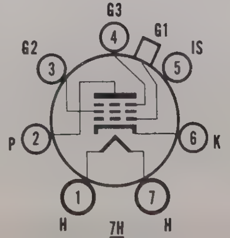
7E


G1
G2
K
P
Hct
H
H

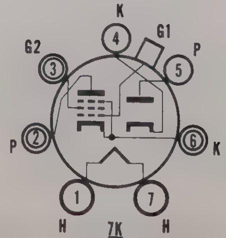
7F


Dp
G
IS
Dp
P
K
H
H

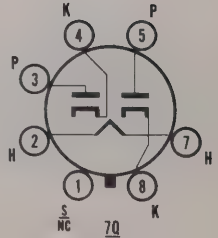
7G


G3
G1
G2
IS
P
K
H
H

7H

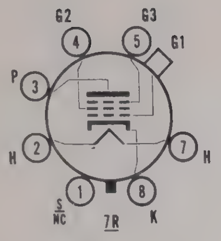

K
G1
G2
P
P
K
H
H

7K

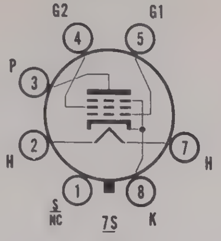


7Q

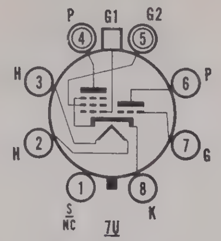
BASING DIAGRAMS FOR SELDOM-USED TUBE REFERENCE GUIDE


4 G2
5 G3
G1
3 P
2 H
7 H
1 S/NC
8 K

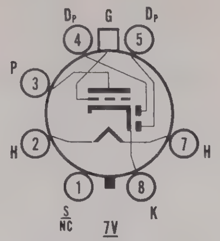
7R


4 G2
5 G1
3 P
2 H
7 H
1 S/NC
8 K

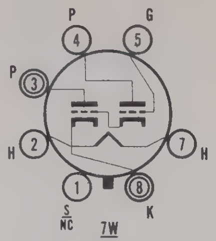
7S


4 P
G1
5 G2
3 H
6 P
2 H
7 G
1 S/NC
8 K

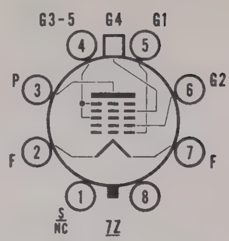
7U


4 DP
G
5 DP
3 P
2 H
7 H
1 S/NC
8 K

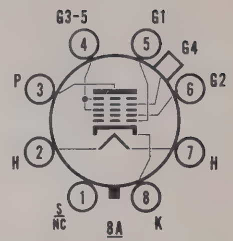
7V


4 P
5 G
3 P
2 H
7 H
1 S/NC
8 K

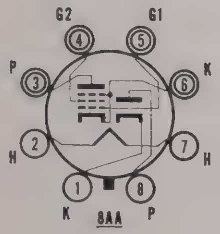
7W


4 G3-5
G4
5 G1
3 P
6 G2
2 F
7 F
1 S/NC
8

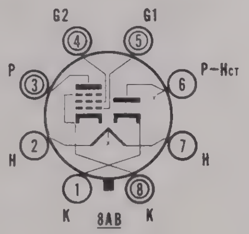
7Z


4 G3-5
5 G1
G4
6 G2
3 P
2 H
7 H
1 S/NC
8 K

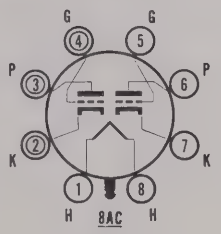
8A


4 G2
5 G1
3 P
6 K
2 H
7 H
1 K
8 P

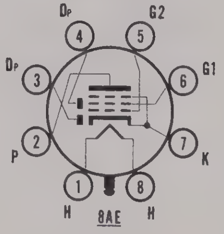
8AA


4 G2
5 G1
3 P
6 P-HCT
2 H
7 H
1 K
8 K

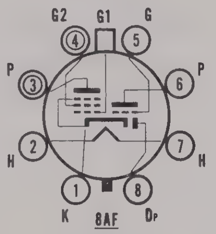
8AB


4 G
5 G
3 P
6 P
2 K
7 K
1 H
8 H

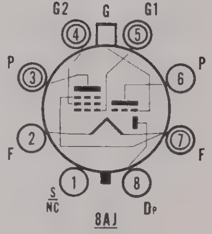
8AC


4 DP
5 G2
3 DP
6 G1
2 P
7 K
1 H
8 H

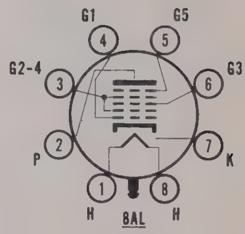
8AE


4 G2
G1
5 G
3 P
6 P
2 H
7 H
1 K
8 DP

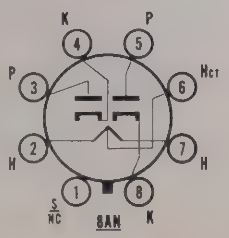
8AF


4 G2
G
5 G1
3 P
6 P
2 F
7 F
1 S/NC
8 DP

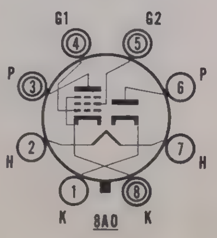
8AJ


4 G1
5 G5
3 G2-4
6 G3
2 P
7 K
1 H
8 H

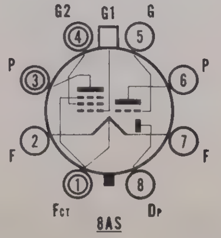
8AL


4 K
5 P
3 P
6 HCT
2 H
7 H
1 S/NC
8 K

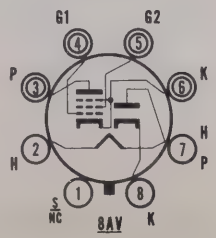
8AN


4 G1
5 G2
3 P
6 P
2 H
7 H
1 K
8 K

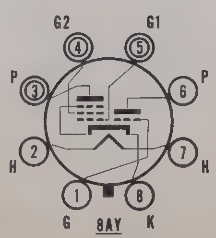
8AO


4 G2
G1
5 G
3 P
6 P
2 F
7 F
1 FCT
8 DP

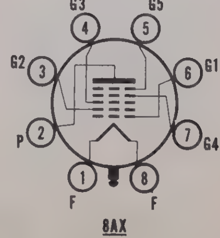
8AS


4 G1
5 G2
3 P
6 K
H
7 P
2 H
1 S/NC
8 K

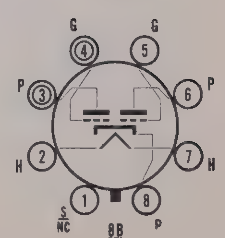
8AV


4 G2
5 G1
3 P
6 P
2 H
7 H
1 G
8 K

8AY

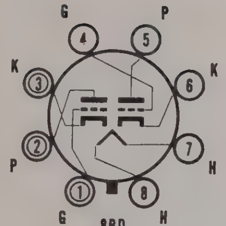

4 G3
5 G5
3 G2
6 G1
2 P
7 G4
1 F
8 F

8AX

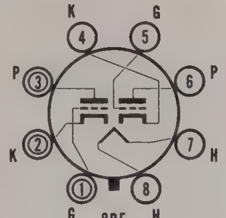

4 G
5 G
3 P
6 P
2 H
7 H
1 S/NC
8 P

8B

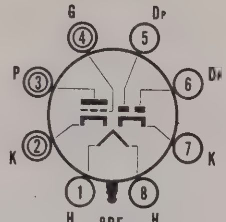
BASING DIAGRAMS FOR SELDOM-USED TUBE REFERENCE GUIDE

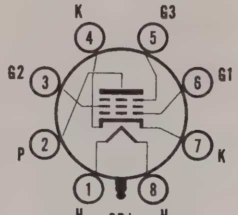


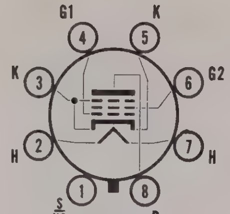
8BD

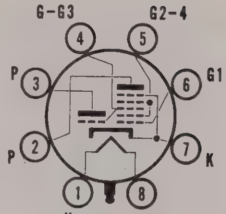


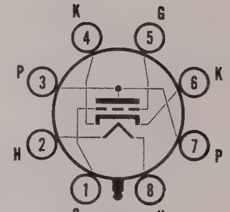
8BE


G
DP
P
DP
K
K
H
H
8BF

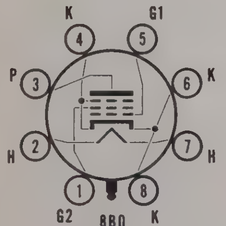

K
G3
G2
G1
P
K
H
H
8BJ

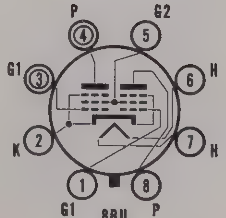

G1
K
K
G2
H
H
S
NC
P
8BK

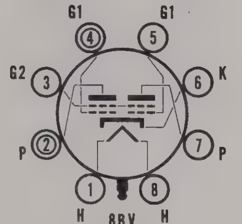

G-G3
G2-4
P
G1
P
K
H
H
8BL

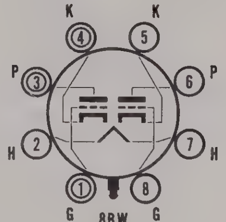


8BN

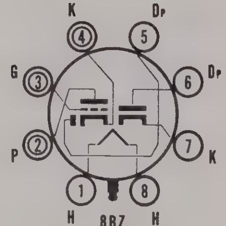

K
G1
P
K
H
H
G2
K
8BO

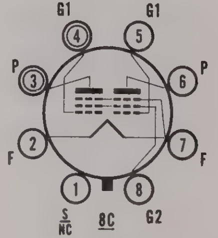

P
G2
G1
H
K
H
G1
P
8BU

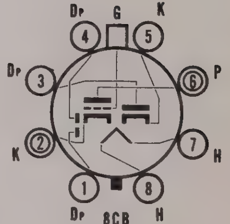

G1
G1
G2
K
P
P
H
H
8BV

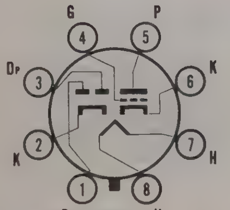


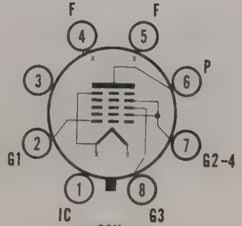
8BW

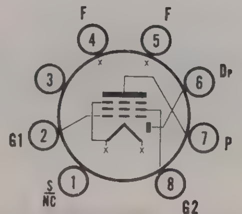

K
DP
G
DP
P
K
H
H
8BZ

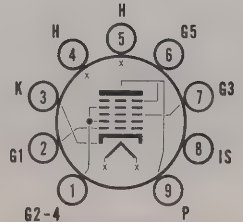

G1
G1
P
P
F
F
S
NC
G2
8C

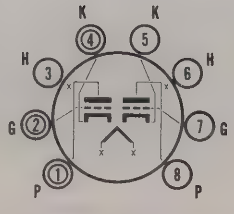

DP
G
K
DP
P
K
H
DP
H
8CB


G
P
DP
K
K
H
DP
H
8CK

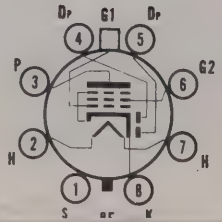

F
F
P
G1
G2-4
IC
G3
8CN

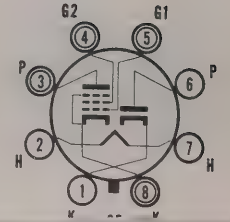

F
F
DP
G1
P
S
NC
G2
8CO


H
H
G5
K
G3
G1
IS
G2-4
P
8CT

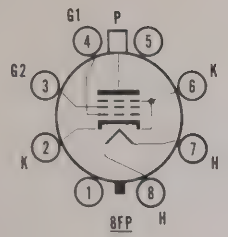


8DG

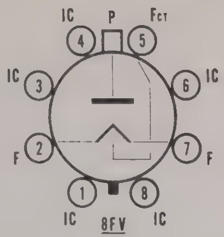

DP
G1
DP
P
G2
H
H



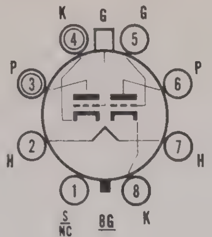
BASING DIAGRAMS FOR SELDOM-USED TUBE REFERENCE GUIDE



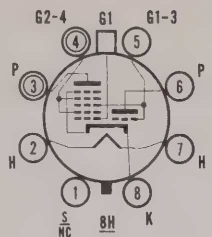
8FP


IC
P
FCT
IC
IC
F
F
IC
IC

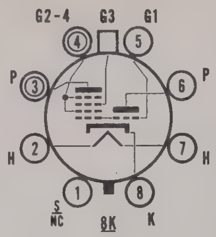
8FV


K
G
G
P
P
H
H
S/NC
K

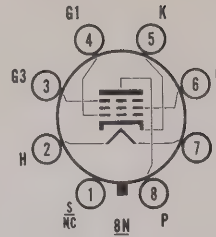
8G


G2-4
G1
G1-3
P
P
H
H
S/NC
K

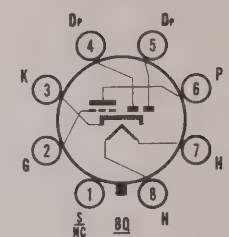
8H


G2-4
G3
G1
P
P
H
H
S/NC
K

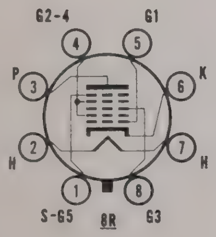
8K


G1
K
G3
G2
H
H
S/NC
P

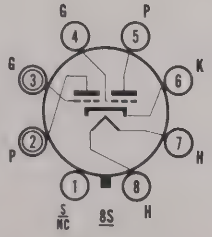
8N


DP
DP
K
P
G
H
S/NC
H

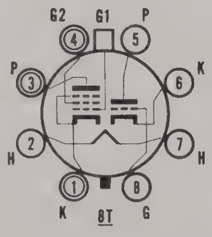
8Q


G2-4
G1
P
K
H
H
S-G5
G3

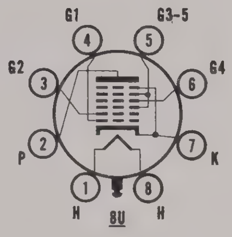
8R


G
P
G
K
P
H
S/NC
H

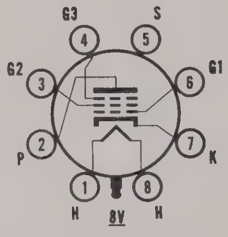
8S


G2
G1
P
P
K
H
H
K
G

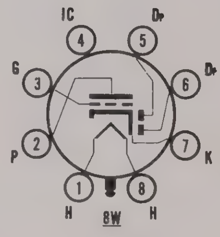
8T


G1
G3-5
G2
G4
P
K
H
H

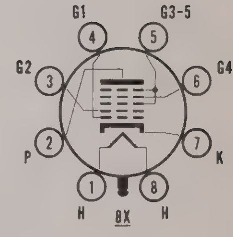
8U


G3
S
G2
G1
P
K
H
H

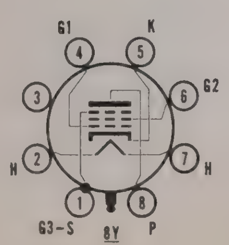
8V


IC
DP
G
DP
P
K
H
H

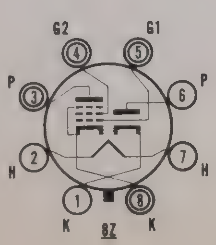
8W


G1
G3-5
G2
G4
P
K
H
H

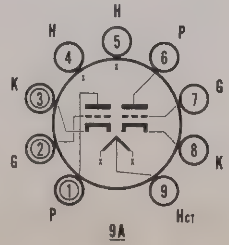
8X


G1
K
G2
H
H
G3-S
P

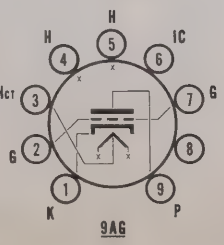
8Y


G2
G1
P
P
H
H
K
K

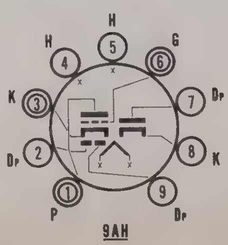
8Z


H
H
P
K
G
G
K
P
HCT

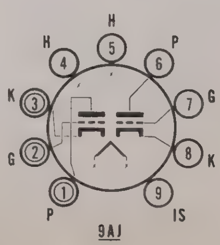
9A


H
H
IC
HCT
G
G
K
P

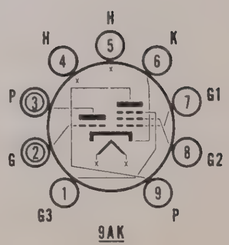
9AG


H
H
G
K
DP
DP
K
P
DP

9AH

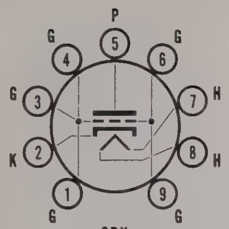

H
H
P
K
G
G
K
P
IS

9AJ

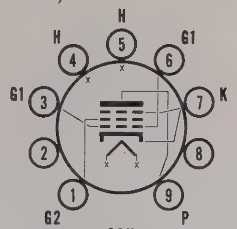

H
H
K
P
G1
G
G2
G3
P

9AK

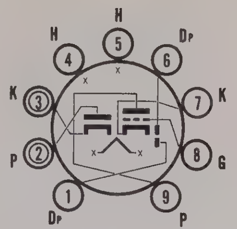
BASING DIAGRAMS FOR SELDOM-USED TUBE REFERENCE GUIDE


P
G
G
G
H
K
H
G
G
1
2
3
4
5
6
7
8
9

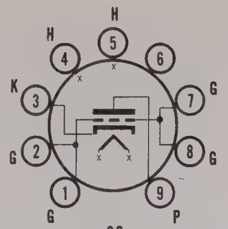
9BX


H
H
G1
G1
K
G2
P
1
2
3
4
5
6
7
8
9

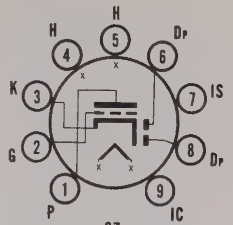
9CK


H
H
Dp
K
K
P
G
Dp
P
1
2
3
4
5
6
7
8
9

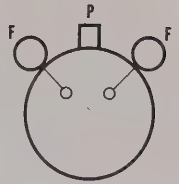
9E


H
H
K
G
G
G
G
P
1
2
3
4
5
6
7
8
9

9S


H
H
Dp
K
IS
G
Dp
P
IC
1
2
3
4
5
6
7
8
9

9Z



5642

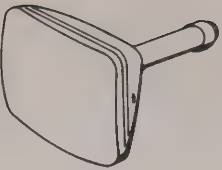
CBS

PICTURE TUBES

(Numerical-Alphabetical Order)

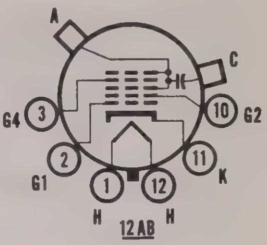
These tubes are selected for being in current demand. Other types can be found in the complete Picture Tube Reference Guide following this section.

CBS 8DP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3	volts
Current, ±10%	0.6	amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Vertical	68 degrees
Diagonal	90 degrees

MAXIMUM RATINGS

(Design center values)	Grid Drive▲	Cathode Drive▲	
Anode voltage, d-c	8000	8000	volts
Grid 4 voltage, d-c	−500 to +500	−500 to +500	volts
Grid 2 voltage, d-c		400	volts
Grid 1 voltage			
Negative bias, d-c	100	0	volts
Positive bias, d-c	0	100	volts
Negative peak	130	2	volts
Positive peak	2	130	volts
Peak heater-cathode voltage:			
Heater negative to cathode			
During warm-up time 15 seconds max.	410	410	volts
After equipment warm-up period	180	180	volts
Heater positive to cathode	180	180	volts

TYPICAL OPERATING CONDITIONS

	Grid Drive▲	Cathode Drive▲	
Anode voltage	6000	6000	volts
Grid 4 (focusing electrode) voltage*	+15 to +315	+15 to +315	volts
Grid 2 voltage	150	150	volts
Grid 1 voltage for cutoff†	−13 to −35	14 to 30	volts
Ion-trap current‡, JETEC coil No. 117	31	31	ma
Ion-trap magnet strength‡	31	31	gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 meg

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes for a 5¼″ x 7″ raster.

†Visual extinction of focused raster.

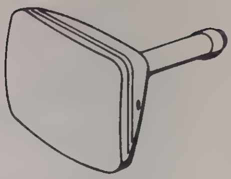
‡As measured with single-field beam bender.

▲Grid drive conditions measured with respect to cathode. Cathode drive conditions measured with respect to grid 1.

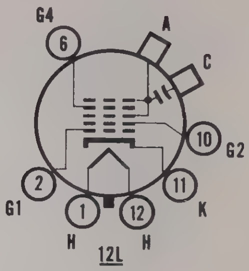
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

CBS

10ABP4



RECTANGULAR PICTURE TUBE



Electrostatic focus . . . spherical face . . . clear filter-glass faceplate . . . 90° deflection . . . external conductive coating

HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Diagonal	90 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	12,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	7500 volts
Grid 4 (focusing electrode) voltage*	0 to 500 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−38 to −62 volts
Ion-trap magnet strength‡, (approx.)	32 gausses

MAXIMUM CIRCUIT VALVE

Grid 1 circuit resistance	1.5 megohms

NOTES:

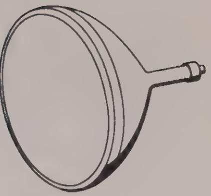
*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes for a 8⅞" x 6⁹⁄₁₆" raster.

†Visual extinction of focused raster.

‡Heppner Model No. E437.

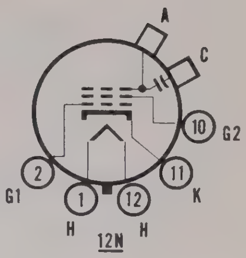
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

CBS 10BP4A



ROUND PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 50° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angle (approximate)	50 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	12,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	125 volts
Heater positive to cathode	125 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	9000 volts
Grid 2 voltage	250 volts
Grid 1 voltage for cutoff†	—22 to 58 volts
Focusing coil current, approx.*	110 ma
Ion-trap current‡, JETEC coil No. 108	120 ma
Ion-trap magnet strength‡, (approx.)	33 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil 106, or equivalent, 3.25" from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 20 FL on a 6" x 8" area.

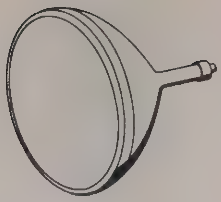
†Visual extinction of focused raster.

‡As measured with double-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

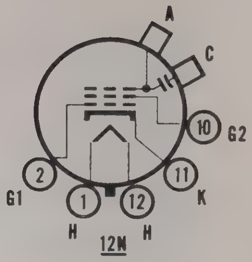
CBS

12LP4A



ROUND PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 54° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angle (approximate)	54 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	12,000 volts
Grid 2 voltage, d-c	410 volts
Grid voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	140 volts
Heater positive to cathode	140 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	11,000 volts
Grid 2 voltage	250 volts
Grid 1 voltage for cutoff†	—22 to —58 volts
Focusing coil current, approx.*	110 ma
Ion-trap current‡, JETEC coil No. 108	120 ma
Ion-trap magnet strength‡, (approx.)	33 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

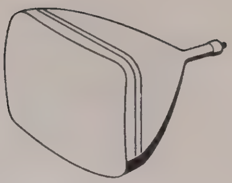
*For JETEC focus coil 106, or equivalent, 3.25″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 20 FL on a 7½″ x 10″ area.

†Visual extinction of focused raster.

‡As measured with double-field beam bender.

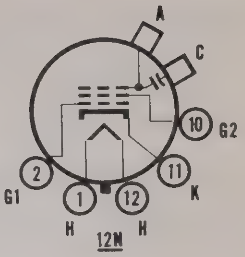
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

CBS 14BP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	14,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	125 volts
Heater positive to cathode	125 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	11,000 volts
Grid 2 voltage	250 volts
Grid 1 voltage for cutoff†	−22 to −58 volts
Focusing coil current, approx.*	110 ma
Ion-trap current‡, JETEC coil No. 111	120 ma
Ion-trap magnet strength‡, (approx.)	33 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil 106, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 20 FL on a 8½″ x 11½″ area.

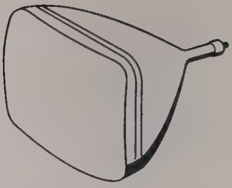
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

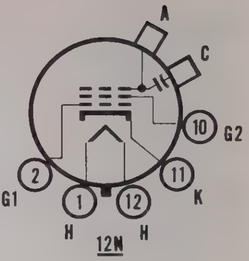
CBS

14CP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	14,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	150 volts
Heater positive to cathode	150 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 2 voltage	250 volts
Grid 1 voltage for cutoff†	—22 to —58 volts
Focusing coil current, approx.*	105 ma
Ion-trap‡, JETEC coil No. 111	
Ion-trap magnet strength‡, (approx.)	32 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

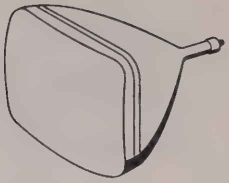
*For JETEC focus coil 109, or equivalent, 3.0″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 35 FL on a 8⅝″ x 11½″ area.

†Visual extinction of focused raster.

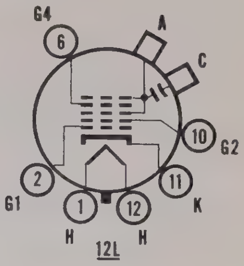
‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

CBS 14QP4



RECTANGULAR PICTURE TUBE



Electrostatic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating

HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	11,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	180 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	9000 volts
Grid 4 (focusing electrode) voltage	−50 to +250 volts
Grid 2 voltage	250 volts
Grid 1 voltage for cutoff†	−24 to −64 volts
Ion-trap current‡, JETEC coil No. 117	24 ma
Ion-trap magnet strength‡, (approx.)	27 gausses

CIRCUIT VALUES

Grid 1 circuit resistance, maximum	1.5 megohms
Grid 2 circuit resistance, minimum■	0.1 megohms
Focusing electrode circuit resistance, minimum■	0.1 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes for a 8½″ x 11⅜″ raster.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

■Protective resistance is advisable to prevent tube damage. One resistor may be common to grids 2 and 4.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

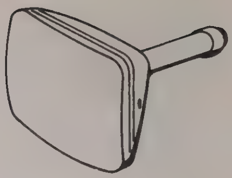
14QP4A

SILVER VISION PICTURE TUBE

Type 14QP4A has an aluminized screen, otherwise it is identical to the 14QP4.

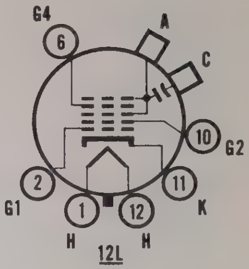
CBS

14RP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3	volts
Current, ±10%	0.6	amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Vertical	68 degrees
Diagonal	90 degrees

MAXIMUM RATINGS

(Design center values)	Grid Drive▲	Cathode Drive▲	
Anode voltage, d-c	14,000	14,000	volts
Grid 4 voltage, d-c	−500 to +500	−500 to +500	volts
Grid 2 voltage, d-c	400	400	volts
Grid 1 voltage			
Negative bias, d-c	110	0	volts
Positive bias, d-c	0	110	volts
Negative peak	160	2	volts
Positive peak	2	160	volts
Peak heater-cathode voltage:			
Heater negative to cathode			
During warm-up time 15 seconds max	410	410	volts
After equipment warm-up period	180	180	volts
Heater positive to cathode	180	180	volts

TYPICAL OPERATING CONDITIONS

	Grid Drive▲	Cathode Drive▲	
Anode voltage	10,000	10,000	volts
Grid 4 (focusing electrode) voltage*	−50 to +350	−50 to +350	volts
Grid 2 voltage	300	300	volts
Grid 1 voltage for cutoff†	−26 to −70	26 to 59	volts
Ion-trap current‡, JETEC coil No. 117	36	36	ma
Ion-trap magnet strength‡	36	36	gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5	meg

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 8¼″ x 11″ raster.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

▲Grid drive conditions measured with respect to cathode. Cathode drive conditions measured with respect to grid 1.

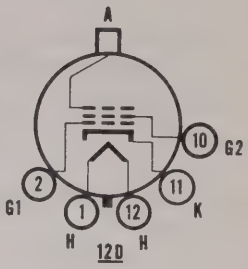
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

CBS

16AP4A*

ROUND PICTURE TUBE

Magnetic focus . . . spherical face . . . 53° deflection . . . metal-cone envelope . . . gray filter-glass faceplate



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angle (approximate)	53 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	14,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	140 volts
Heater positive to cathode	140 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Focusing coil current, approx.*	80 ma
Ion-trap current‡, JETEC coil No. 108	99 ma
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 10″ x 13¼″ area.

†Visual extinction of focused raster.

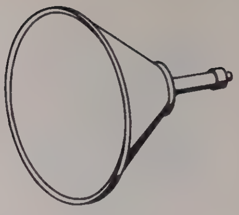
‡As measured with double-field beam bender.

★Type 16AP4 has a clear glass faceplate.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

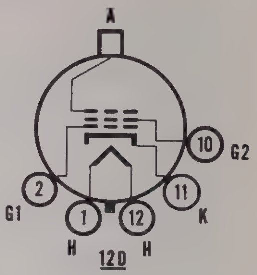
CBS

16GP4



ROUND PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . metal-cone envelope



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angle (approximate)	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	14,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	150 volts
Heater positive to cathode	150 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Focusing coil current, approx.*	100 ma
Ion-trap current‡, JETEC coil No. 117	35 ma
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 10″ x 13¼″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

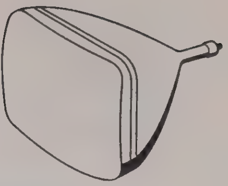
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

16GP4B

Type 16GP4B has frosted gray filter-glass faceplate, otherwise it is identical to the 16GP4.

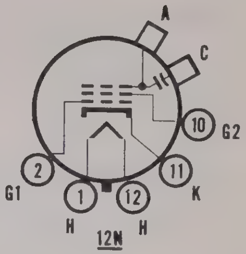
CBS

16KP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	150 volts
Heater positive to cathode	150 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	14,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to 72 volts
Focusing coil current, approx.*	108 ma
Ion-trap current‡, JETEC coil No. 111	75 ma
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.0″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 35 FL on a 10⅛″ x 13½″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

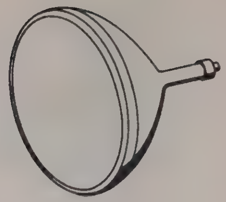
16KP4A

SILVER VISION PICTURE TUBE

Type 16KP4A has an aluminized screen, otherwise it is identical to the 16KP4.

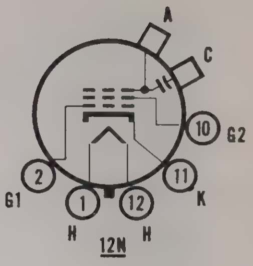
CBS

16LP4A



ROUND PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 52° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angle (approximate)	52 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	125 volts
Heater positive to cathode	125 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Focusing coil current, approx.*	110 ma
Ion-trap current‡, JETEC coil No. 108	120 ma
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

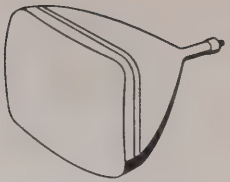
*For JETEC focus coil No. 109, or equivalent, 3.25″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 20 FL on a 10¼″ x 14½″ area.

†Visual extinction of focused raster.

‡As measured with double-field beam bender.

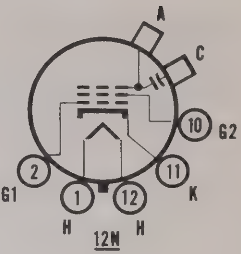
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

CBS 16RP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximately)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	150 volts
Heater positive to cathode	150 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Focusing coil current, approx.*	110 ma
Ion-trap current‡, JETEC coil No. 108	120 ma
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.5″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 10⅛″ x 13½″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

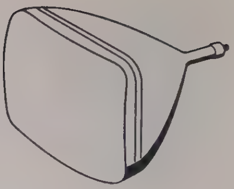
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

16RP4A

SILVER VISION PICTURE TUBE

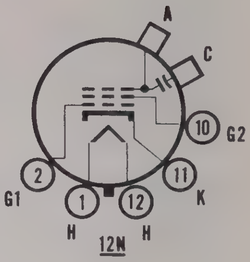
Type 16RP4A has an aluminized screen, otherwise it is identical to the 16RP4.

CBS 16TP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	66 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	14,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	150 volts
Heater positive to cathode	150 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Focusing coil current, approx.*	99 ma
Ion-trap current‡, JETEC coil No. 111	75 ma
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.0″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 35 FL on a 13½″ x 10⅛″ area.

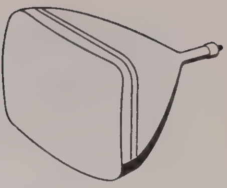
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

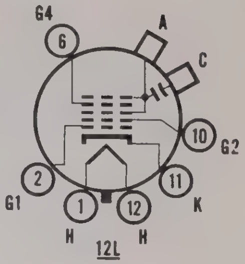
CBS

17ATP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3	volts
Current, ±10%	0.6	amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	80 degrees
Vertical	65 degrees
Diagonal	90 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 4 (focusing electrode) voltage*	−50 to +265 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap magnet strength‡, (approx.)	34 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 10¾″ x 14¼″ raster.

†Visual extinction of focused raster.

‡As measured with double-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

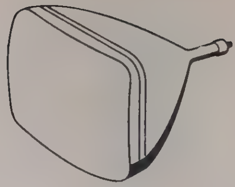
17ATP4A

SILVER VISION PICTURE TUBE

Type 17ATP4A has an aluminized screen, otherwise it is identical to the 17ATP4.

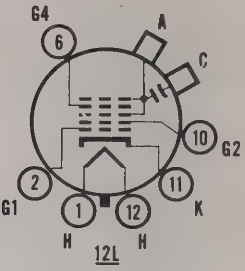
CBS

17AVP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Vertical	68 degrees
Diagonal	90 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 4 (focusing electrode) voltage*	−48 to +264 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap current‡, JETEC coil No. 117	30 ma
Ion-trap magnet strength‡, (approx.)	30 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 10¾″ x 14¼″ raster.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

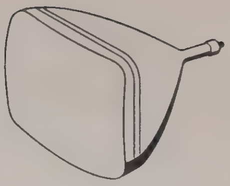
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

17AVP4A

SILVER VISION PICTURE TUBE

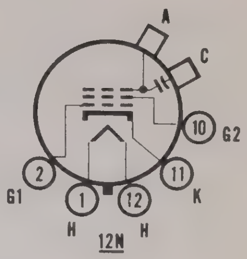
Type 17AVP4A has an aluminized screen, otherwise it is identical to the 17AVP4.

CBS 17BP4A



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max	410 volts
After equipment warm-up period	150 volts
Heater positive to cathode	150 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 2 voltage†	300 volts
Grid 1 voltage for cutoff	−28 to −72 volts
Focusing coil current, approx.*	100 ma
Ion-trap, JETEC coil No. 111	
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1lsg} adjusted for brightness of 30 FL on a 10¾″ x 14¼″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

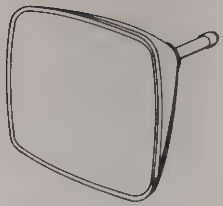
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

17BP4B

SILVER VISION PICTURE TUBE

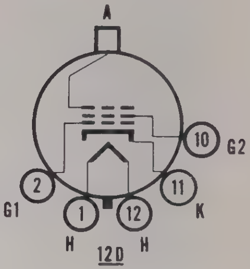
Type 17BP4B has an aluminized screen, otherwise it is identical to the 17BP4A.

CBS 17CP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray frosted filter-glass faceplate . . . 70° deflection . . . metal cone



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Focusing coil current, approx.*	96 ma
Ion-trap current‡, JETEC coil No. 111	75 ma
Ion-trap magnet strength‡, (approx.)	45 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 10¹¹⁄₁₆″ x 14⅜″ area.

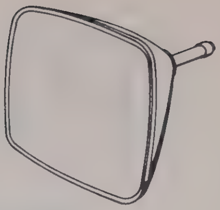
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

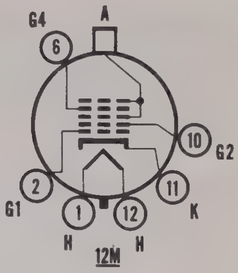
CBS

17GP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . spherical face . . . frosted filter-glass faceplate . . . 70° deflection . . . metal cone



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	66 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 4 (focusing electrode) voltage, d-c	5,000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 4 (focusing electrode) voltage	2040 to 2760 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Ion-trap current‡, JETEC coil No. 117	35 ma
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

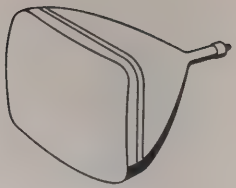
NOTES:

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

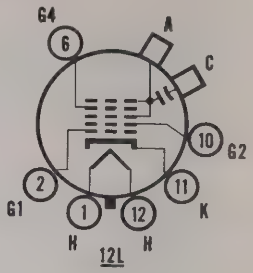
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

17HP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2, voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	14,000 volts
Grid 4 (focusing electrode) voltage*	−56 to +310 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap current‡, JETEC coil No. 117	37 ma
Ion-trap magnet strength‡, (approx.)	37 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes for a 10¾″ x 14¼″ raster.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

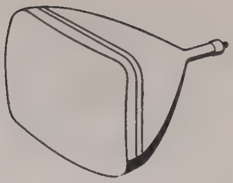
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

17HP4B

SILVER VISION PICTURE TUBE

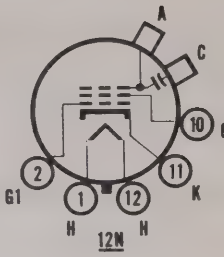
Type 17HP4B has an aluminized screen, otherwise it is identical to the 17HP4.

CBS 17JP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	150 volts
Heater positive to cathode	150 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	16,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Focusing coil current, approx.*	100 ma
Ion-trap current‡, JETEC coil No. 111	82 ma
Ion-trap magnet strength‡, (approx.)	45 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

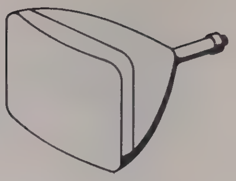
*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 10¾″ x 14¼″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

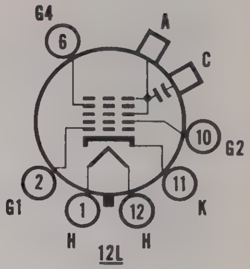
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

CBS 17LP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . cylindrical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 4 (focusing electrode) voltage*	−48 to +260 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap current‡, JETEC coil No. 111	70 ma
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes for a 10¾″ x 14¼″ raster.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

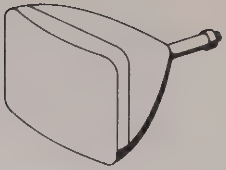
17LP4A

SILVER VISION PICTURE TUBE

Type 17LP4A has an aluminized screen, otherwise it is identical to the 17LP4.

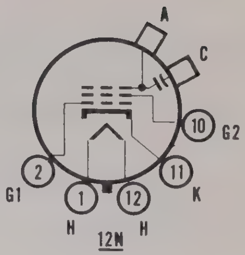
CBS

17QP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . cylindrical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	150 volts
Heater positive to cathode	150 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Focusing coil current, approx.*	100 ma
Ion-trap current‡, JETEC coil No. 111	70 ma
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 10¾″ x 14¼″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

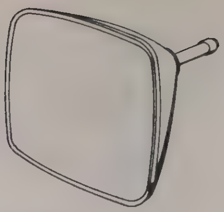
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

17QP4A

SILVER VISION PICTURE TUBE

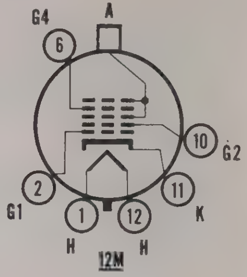
Type 17QP4A has an aluminized screen, otherwise it is identical to the 17QP4.

CBS 17TP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . spherical face . . . frosted filter-glass faceplate . . . 70° deflection . . . metal cone



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	14,000 volts
Grid 4 (focusing electrode) voltage*	−55 to +300 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap current‡, JETEC coil No. 111	70 ma
Ion-trap magnet strength‡, (approx.)	45 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes for a 11″ x 14⅝″ raster.

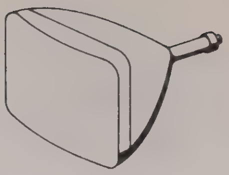
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

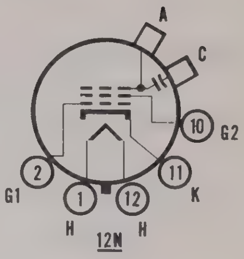
CBS

17YP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . cylindrical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	150 volts
Heater positive to cathode	150 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	16,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Focusing coil current, approx.*	100 ma
Ion-trap magnet strength‡, (approx.)	45 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

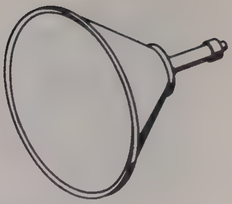
*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 20 FL on a 10¾″ x 14¼″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

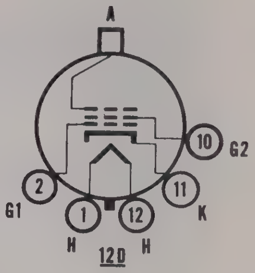
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

19AP4A



ROUND PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 66° deflection . . . metal cone



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angle (approximate)	66 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	150 volts
Heater positive to cathode	150 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Focusing coil current, approx.*	140 ma
Ion-trap current‡, JETEC coil No. 111	75 ma
Ion-trap magnet strength‡, (approx.)	45 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 18 FL on a 11¾″ x 15¾″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

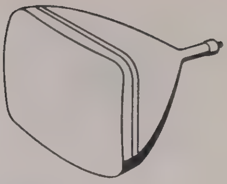
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

19AP4B

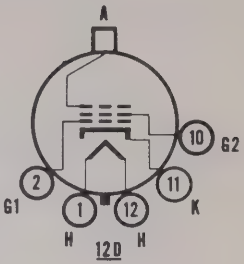
Type 19AP4B has frosted gray filter-glass faceplate, otherwise it is identical to the 19AP4A.

CBS

20CP4



RECTANGULAR PICTURE TUBE



Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection

HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	66 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	150 volts
Heater positive to cathode	150 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Focusing coil current, approx.*	100 ma
Ion-trap current‡, JETEC coil No. 117	36 ma
Ion-trap magnet strength‡, (approx.)	36 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference, line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 12¾″ x 17″ area.

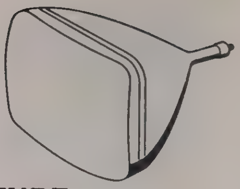
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

CBS

20CP4A



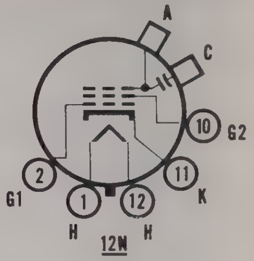
RECTANGULAR PICTURE TUBE

Type 20CP4A has an external conductive coating, otherwise it is identical to the 20CP4.

DIRECT INTERELECTRODE CAPACITANCES

External Conductive Coating* to Anode:

Maximum	1500 μμf
Minimum	500 μμf



*Contains 2-inch x 2-inch contact area located 90° ccw from anode contact as viewed from base and 2±¼ inches above reference line.

20CP4B

SILVER VISION PICTURE TUBE

Type 20CP4B has an aluminized screen, otherwise it is identical to the 20CP4.

20CP4D

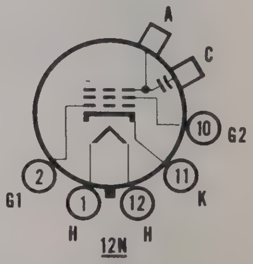
SILVER VISION PICTURE TUBE

Type 20CP4D has an aluminized screen and an external conductive coating, otherwise it is identical to the 20CP4.

DIRECT INTERELECTRODE CAPACITANCES

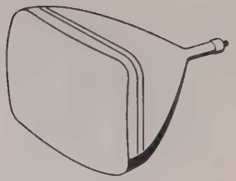
External Conductive Coating* to Anode:

Maximum	1500 μμf
Minimum	500 μμf



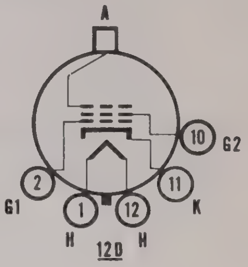
*Contains 2-inch x 2-inch contact area located 90° ccw from anode contact as viewed from base and 2±¼ inches above reference line.

CBS 20DP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection



HEATER CHARACTERISTICS

Voltage	6.3	volts
Current, ±10%	0.6	amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 2 voltage, d-c	410 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	150 volts
Heater positive to cathode	150 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Focusing coil current, approx.*	95 ma
Ion-trap current‡, JETEC coil No. 111	75 ma
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 12¾″ x 17″ area.

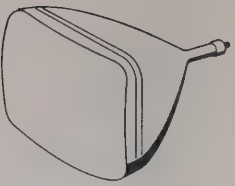
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

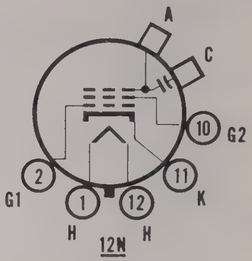
CBS

20DP4A



RECTANGULAR PICTURE TUBE

Type 20DP4A has an external conductive coating, otherwise it is identical to the 20DP4.



DIRECT INTERELECTRODE CAPACITANCES

External Conductive Coating* to Anode:

Maximum	1500 $\mu\mu$f
Minimum	500 $\mu\mu$f

*Contains 2-inch x 2-inch contact area located 90° ccw from anode contact as viewed from base and 2±¼ inches above reference line.

20DP4B

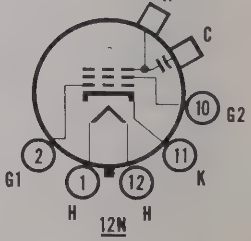
SILVER VISION PICTURE TUBE

Type 20DP4B has an aluminized screen, otherwise it is identical to the 20DP4.

20DP4C

SILVER VISION PICTURE TUBE

Type 20DP4C has an aluminized screen and an external conductive coating, otherwise it is identical to the 20DP4.



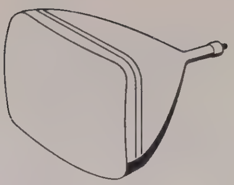
DIRECT INTERELECTRODE CAPACITANCES

External Conductive Coating* to Anode:

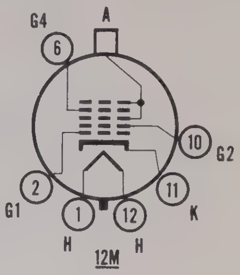
Maximum	1500 $\mu\mu$f
Minimum	500 $\mu\mu$f

*Contains 2-inch x 2-inch contact area located 90° ccw from anode contact as viewed from base and 2±¼ inches above reference line.

CBS 20HP4



RECTANGULAR PICTURE TUBE



Electrostatic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection

HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	66 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	14,000 volts
Grid 4 (focusing electrode) voltage*	−56 to 310 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap current‡, JETEC coil No. 111	85 ma

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 12¾″ x 17″ raster.

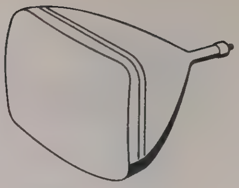
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

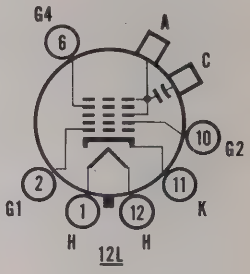
CBS

20HP4A



RECTANGULAR PICTURE TUBE

Type 20HP4A has an external conductive coating, otherwise it is identical to the 20HP4.



DIRECT INTERELECTRODE CAPACITANCES

External Conductive Coating* to Anode:	
Maximum	1500 μμf
Minimum	500 μμf

*Contains 2-inch x 2-inch contact area located 90° ccw from anode contact as viewed from base and 2±¼ inches above reference line.

20HP4C

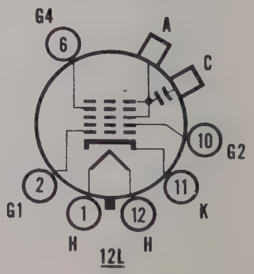
SILVER VISION PICTURE TUBE

Type 20HP4C has an aluminized screen, otherwise it is identical to the 20HP4.

20HP4D

SILVER VISION PICTURE TUBE

Type 20HP4D has an aluminized screen and an external conductive coating, otherwise it is identical to the 20HP4.



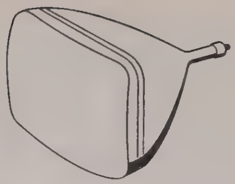
DIRECT INTERELECTRODE CAPACITANCES

External Conductive Coating* to Anode:	
Maximum	1500 μμf
Minimum	500 μμf

*Contains 2-inch x 2-inch contact area located 90° ccw from anode contact as viewed from base and 2±¼ inches above reference line.

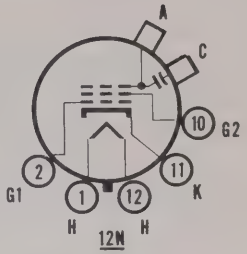
CBS

21ACP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Vertical	68 degrees
Diagonal	90 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	20,000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	16,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Focusing coil current, approx.*	117 ma
Ion-trap current‡, JETEC coil No. 117	40 ma
Ion-trap magnet strength‡, (approx.)	40 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 15″ x 19⅛″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

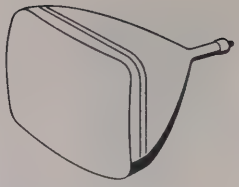
21ACP4A

SILVER VISION PICTURE TUBE

Type 21ACP4A has an aluminized screen, otherwise it is identical to the 21ACP4.

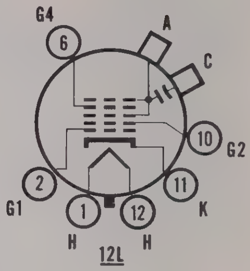
CBS

21ALP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Vertical	68 degrees
Diagonal	90 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	14,000 volts
Grid 4 (focusing electrode) voltage*	−55 to +300 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap magnet strength‡, (approx.)	40 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 15″ x 19⅛″ raster.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

21ALP4A

SILVER VISION PICTURE TUBE

Type 21ALP4A has an aluminized screen, otherwise it is identical to the 21ALP4.

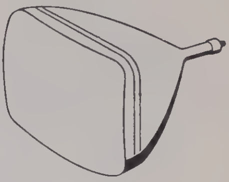
21ALP4B

SILVER VISION PICTURE TUBE

Type 21ALP4B has Maximum Anode Voltage, d-c (Design Center Values) of 20,000 volts; otherwise it is identical to the 21ALP4A.

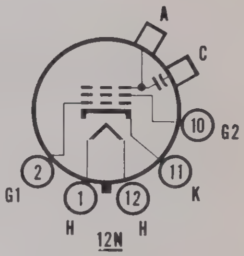
CBS

21AMP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Vertical	68 degrees
Diagonal	90 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	16,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Focusing coil current, approx.*	100 ma
Ion-trap current‡, JETEC coil No. 111	95 ma
Ion-trap magnet strength‡, (approx.)	45 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 15″ x 19⅛″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

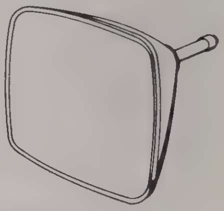
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

21AMP4A

SILVER VISION PICTURE TUBE

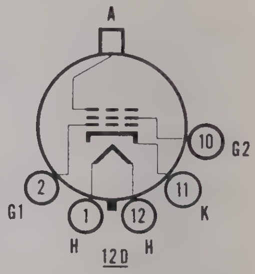
Type 21AMP4A has an aluminized screen, otherwise it is identical to the 21AMP4.

CBS 21AP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . frosted filter-glass faceplate . . . metal cone . . . 70° deflection



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	66 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	14,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Focusing coil current, approx.*	104 ma
Ion-trap current‡, JETEC coil No. 111	90 ma
Ion-trap magnet strength‡, (approx.)	45 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 13$\frac{15}{16}$″ x 18$\frac{3}{8}$″ area.

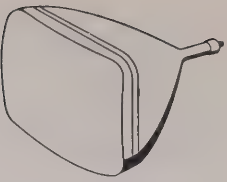
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

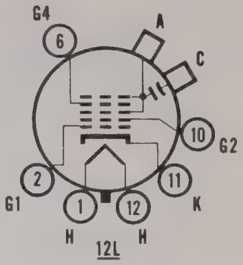
CBS

21ATP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . external conductive coating . . . aluminized screen



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Vertical	68 degrees
Diagonal	90 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grd 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	16,000 volts
Grid 4 (focusing electrode) voltage*	−64 to +350 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 15″ x 19⅛″ raster.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

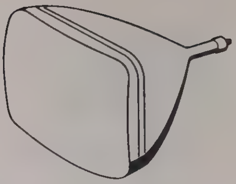
21ATP4A

SILVER VISION PICTURE TUBE

Type 21ATP4A has Maximum Anode Voltage, d-c (Design Center Value) of 20,000 volts; otherwise it is identical to the 21ATP4.

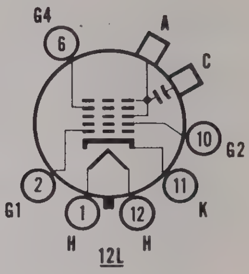
CBS

21AUP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . spherical face . . . gray filter-glass faceplate . . . 72° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	67 degrees
Vertical	53 degrees
Diagonal	72 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	14,000 volts
Grid 4 (focusing electrode) voltage*	−55 to +300 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap current‡, JETEC coil No. 117	40 ma
Ion-trap magnet strength‡, (approx.)	40 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 15″ x 19⅛″ raster.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

21AUP4A

SILVER VISION PICTURE TUBE

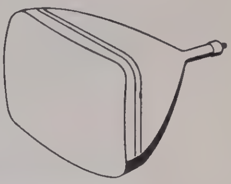
Type 21AUP4A has an aluminized screen, otherwise it is identical to the 21AUP4.

21AUP4B

SILVER VISION PICTURE TUBE

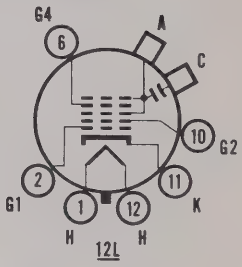
Type 21AUP4B has a Maximum Anode Voltage, d-c (Design Center Value) of 20,000 volts; otherwise it is identical to the 21AUP4A.

CBS 21AVP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . spherical face . . . gray filter-glass faceplate . . . 72° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	67 degrees
Vertical	53 degrees
Diagonal	72 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	14,000 volts
Grid 4 (focusing electrode) voltage*	−55 to +350 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap current†, JETEC coil No. 117	40 ma
Ion-trap magnet strength‡, (approx.)	40 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 15″ x 19⅛″ raster.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

21AVP4A

SILVER VISION PICTURE TUBE

Type 21AVP4A has an aluminized screen, otherwise it is identical to the 21AVP4.

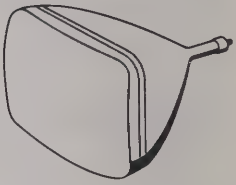
21AVP4B

SILVER VISION PICTURE TUBE

Type 21AVP4B has a Maximum Anode Voltage, d-c (Design Center Value) of 20,000 volts, otherwise it is identical to the 21AVP4A.

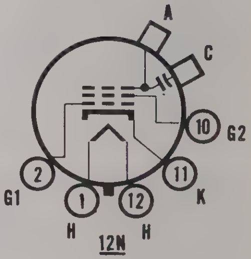
CBS

21AWP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 72° deflection . . . external conductive coating . . . aluminized screen



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	68 degrees
Vertical	53 degrees
Diagonal	72 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	16,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Focusing coil current, approx.*	108 ma
Ion-trap current‡, JETEC coil No. 117	40 ma
Ion-trap magnet strength‡, (approx.)	40 gausses

21AWP4 (cont.)

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 20 FL on a 15″ x 19⅛″ area.

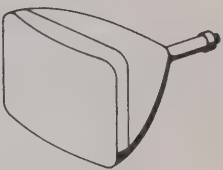
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

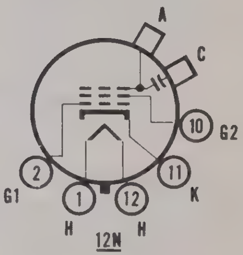
CBS

21EP4A



RECTANGULAR PICTURE TUBE

Magnetic focus . . . cylindrical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	150 volts
Heater positive to cathode	150 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	12,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Focusing coil current, approx.*	95 ma
Ion-trap current‡, JETEC coil No. 111	70 ma
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

21MP4 (cont.)

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	66 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	16,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	14,000 volts
Grid 4 (focusing electrode) voltage	−55 to +300 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap current‡, JETEC coil No. 117	37 ma
Ion-trap magnet strength‡, (approx.)	37 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

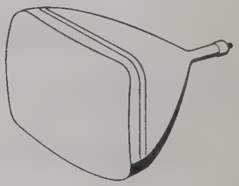
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

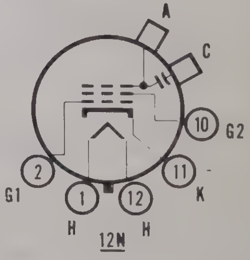
CBS

21WP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	66 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	16,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Focusing coil current, approx.*	100 ma
Ion-trap current‡, JETEC coil No. 117	35 ma
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.25″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 12¾″ x 17″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

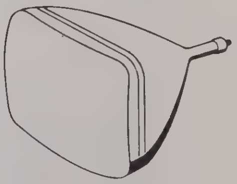
21WP4A

SILVER VISION PICTURE TUBE

Type 21WP4A has an aluminized screen, otherwise it is identical to the 21WP4.

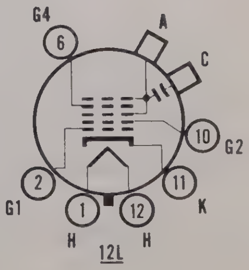
CBS

21XP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

21XP4 (cont.)

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	66 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	16,000 volts
Grid 4 (focusing electrode) voltage*	−64 to +352 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap current‡, JETEC coil No. 117	35 ma
Ion-trap magnet strength‡, (approx.)	35 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 12¾″ x 17″ raster.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

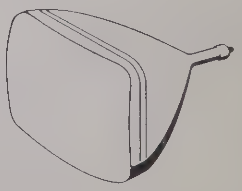
21XP4A

SILVER VISION PICTURE TUBE

Type 21XP4A has an aluminized screen, otherwise it is identical to the 21XP4.

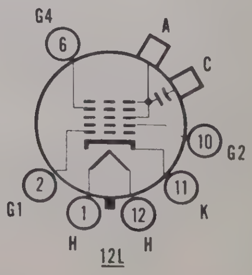
CBS

21YP4



RECTANGULAR PICTURE TUBE

Electrostatic focus . . . spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	14,000 volts
Grid 4 (focusing electrode) voltage*	−55 to +300 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap current‡, JETEC coil No. 117	40 ma
Ion-trap magnet strength‡, (approx.)	40 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a $14\frac{3}{16}''$ x $19\frac{1}{8}''$ raster.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

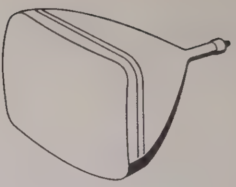
21YP4A

SILVER VISION PICTURE TUBE

Type 21YP4A has an aluminized screen, otherwise it is identical to the 21YP4.

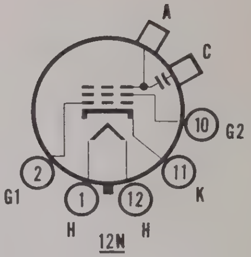
CBS

21ZP4A



RECTANGULAR PICTURE TUBE

Magnetic focus - - - spherical face . . . gray filter-glass faceplate . . . 70° deflection . . . external conductive coating



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	65 degrees
Vertical	50 degrees
Diagonal	70 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	18,000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	16,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Focusing coil current, approx.*	100 ma
Ion-trap current‡, JETEC coil No. 111	95 ma
Ion-trap magnet strength‡, (approx.)	45 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 14³⁄₁₆″ x 19⅛″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

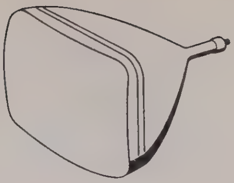
21ZP4B

SILVER VISION PICTURE TUBE

Type 21ZP4B has an aluminized screen, otherwise it is identical to the 21ZP4A.

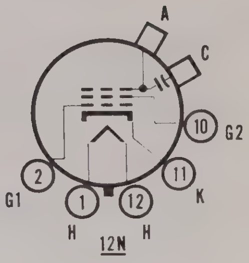
CBS

24ADP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . external conductive coating . . . aluminized screen



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Vertical	68 degrees
Diagonal	90 degrees

MAXIMUM RATINGS (Absolute maximum values)

Anode voltage, d-c	24,200 volts
Grid 2 voltage, d-c	660 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	155 volts
Negative peak value	220 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	450 volts
After equipment warm-up period	200 volts
Heater positive to cathode	200 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	18,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Focusing coil current, approx.*	125 ma
Ion-trap current‡, JETEC coil No. 117	32 ma
Ion-trap magnet strength‡, (approx.)	36 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 30 FL on a 16⅞″ x 21 7/16″ area.

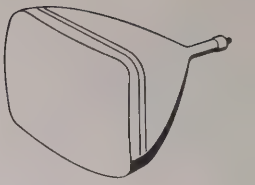
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

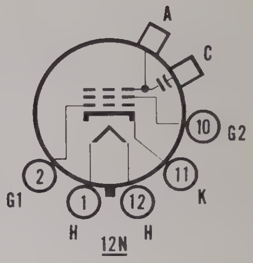
CBS

24CP4A



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . external conductive coating . . . aluminized screen



HEATER CHARACTERISTICS

Voltage	6.3	volts
Current, ±10%	0.6	amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Vertical	68 degrees
Diagonal	90 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	20,000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	16,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Focusing coil current, approx.*	105 ma
Ion-trap current‡, JETEC coil No. 111	85 ma

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00" from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 25 FL on a 16⅞" x 21⅞" area.

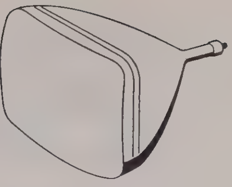
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

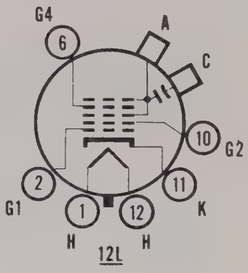
CBS

24DP4A



RECTANGULAR PICTURE TUBE

Electrostatic focus...spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . external conductive coating . . . aluminized screen



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Vertical	68 degrees
Diagonal	90 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	20,000 volts
Grid 4 (focusing electrode) voltage, d-c	−500, +1000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	140 volts
Negative peak value	200 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	16,000 volts
Grid 4 (focusing electrode) voltage*	−64 to +350 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	−28 to −72 volts
Ion-trap current‡, JETEC coil No. 117	33 ma
Ion-trap magnet strength‡, (approx.)	33 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*With the combined Grid 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 16⅞″ x 21⅞″ raster.

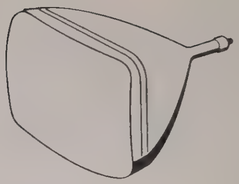
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

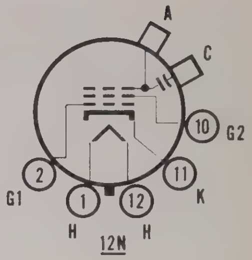
CBS

24TP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . external conductive coating . . . aluminized screen



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Vertical	68 degrees
Diagonal	90 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	20,000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	14,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Focusing coil current, approx.*	110 ma
Ion-trap current‡, JETEC coil No. 117	36 ma
Ion-trap magnet strength‡, (approx.)	36 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

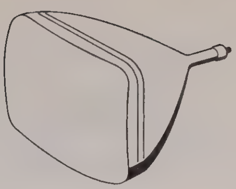
†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

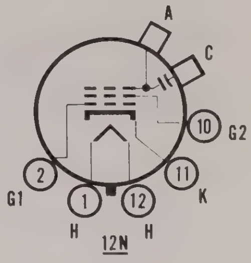
CBS

24VP4A



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . external conductive coating . . . aluminized screen



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Vertical	68 degrees
Diagonal	90 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	22,000 volts
Grid 2 voltage, d-c	600 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	165 volts
Negative peak value	240 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	20,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff†	—28 to —72 volts
Focusing coil current, approx.*	125 ma
Ion-trap current‡, JETEC coil No. 111	135 ma
Ion-trap magnet strength‡, (approx.)	40 gausses

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 20 FL on a 16¹⁄₁₆″ x 21⅜″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

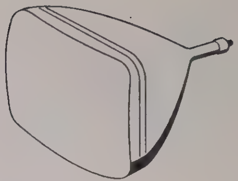
CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

24YP4

SILVER VISION PICTURE TUBE

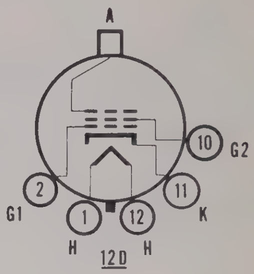
Type 24YP4 has an external conductive coating of 2000 to 2500 $\mu\mu$f capacitance, otherwise it is identical to the 24DP4A.

CBS 27EP4



RECTANGULAR PICTURE TUBE

Magnetic focus . . . spherical face . . . gray filter-glass faceplate . . . 90° deflection . . . aluminized screen



HEATER CHARACTERISTICS

Voltage	6.3 volts
Current, ±10%	0.6 amperes

ELECTRICAL DATA

Focusing method	Magnetic
Deflecting method	Magnetic
Deflection angles (approximate)	
Horizontal	85 degrees
Vertical	68 degrees
Diagonal	90 degrees

MAXIMUM RATINGS (Design center values)

Anode voltage, d-c	20,000 volts
Grid 2 voltage, d-c	500 volts
Grid 1 voltage, d-c	
Negative bias value, d-c	125 volts
Positive bias value, d-c	0 volts
Positive peak value	2 volts
Peak heater-cathode voltage:	
Heater negative to cathode	
During warm-up period of 15 seconds max.	410 volts
After equipment warm-up period	180 volts
Heater positive to cathode	180 volts

TYPICAL OPERATING CONDITIONS

Anode voltage	16,000 volts
Grid 2 voltage	300 volts
Grid 1 voltage for cutoff	—28 to —72 volts
Focusing coil current, approx.*	105 ma
Ion-trap current‡, JETEC coil No. 111	85 ma

MAXIMUM CIRCUIT VALUE

Grid 1 circuit resistance	1.5 megohms

NOTES:

*For JETEC focus coil No. 109, or equivalent, 3.00″ from reference line with E_{c1} and E_{c1sig} adjusted for brightness of 20 FL on a 18½″ x 24″ area.

†Visual extinction of focused raster.

‡As measured with single-field beam bender.

CAUTION: Shielding for X-rays is recommended for personal protection at close range if this tube is operated in excess of 16,000 volts or over Maximum Rated Anode Voltage, whichever is less. Safety glass covering tube's faceplate is usually sufficient.

27RP4

SILVER VISION PICTURE TUBE

Type 27RP4 has external conductive coating, otherwise it is identical to the 27EP4. See type 24VP4A for basing.

DIRECT INTERELECTRODE CAPACITANCES

External Conductive Coating* to Anode:	
Maximum	750 $\mu\mu$f
Minimum	500 $\mu\mu$f

*Contains 2-inch x 2-inch contact area located 90° ccw from anode contact as viewed from base and 2±¼ inches above reference line.

CBS

PICTURE TUBE REFERENCE GUIDE

Contains all picture tubes for television,
including color picture tubes.

CBS PICTURE TUBES

CBS TELEVISION PICTURE TUBES (Color Types)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION				
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLE§	FOCUSING	CONVERGENCE	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING ($\mu\mu f$)	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS*	GRID 2 VOLTS	CONVERGENCE VOLTS*	TYPE
15GP22	C, S, Ro, A	Glass	45°	Electro.	Electro.	15GP22	26⅛	15¾	1500–3000	20,000	500	20,000	2400 to 3800	140 to 315	8500 to 10,200	**15GP22**
15HP22	C, S, Ro, A	Glass	45°	Electro.	Electro.	15HP22	26⅛	15¾	1500–2500	20,000	500	20,000	3100	240	9300	**15HP22**
19TP22	C, S, Ro, A	Glass	60°	Electro.	Electro.	19TP22	24¾	20-4/5	1500–3000	22,000	500	20,000	1950 to 3250	200	8500 to 10,200	**19TP22**
19VP22	C, S, Ro, A	Glass	62°	Electro.	Magnetic	14W	$26\frac{7}{16}$	$20\frac{27}{32}$	1500–3000	27,000	500	25,000	6500 to 8000	150 to 330	—	**19VP22**
21AXP22	C, S, Ro, A	Metal	70°	Electro.	Magnetic	14W	$25\frac{5}{16}$	21¼	—	25,000	800	25,000	3800 to 5300	140 to 310	—	**21AXP22**
21AXP22A	C, S, Ro, A	Metal	70°	Electro.	Magnetic	14AH	$25\frac{5}{16}$	21¼	—	25,000	800	25,000	3800 to 5300	130 to 370	—	**21AXP22A**

NOTES:

All tubes in this section contain three electron-beam sources with heater ratings of 6.3 volts and 1.8 amperes total current (heaters electrically paralleled within the tube). The screens of the tubes are of the tri-color (red, green, and blue), phosphor-dot type.

All tubes in this section are magnetically deflected.

Face-Plate Code: C—clear, G—gray, Ro—round, S—spherical.

†Design-center values.

*For each of the three electron-beam sources.

*Does not include the dynamic convergence component.

§Horizontal deflection angle is given.

CBS

TELEVISION PICTURE TUBES (Monochrome Types)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLES§	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING (µµf)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS	GRID 2 VOLTS	TYPE
3NP4	C, S, Ro, A	Glass	42°	Magnetic	5BV	10⅜	2 13/16	275–375	None	25,000	—	24,000	—	—	**3NP4**
5ACP4	C, S, Ro, A	Glass	53°	Electro.	8EQ	11½	5 1/32	No Coating	None	18,000	410	12,000	0	250	**5ACP4**
5AXP4	C, S, Ro	Glass	53°	Auto–Electro.	12S	11	5 1/32	No Coating	None	18,000	500	14,000	—	300	**5AXP4**
5AZP4	C, S, Ro, A	Glass	50°	Electro.	12AA	12 9/16	5⅛	No Coating	None	40,000	400	36,000	6650 to 8100	200	**5AZP4**
5FP4A	C, S, Ro	Glass	53°	Magnetic	5AN	11½	5 1/32	No Coating	None	8000	410	6,000	—	250	**5FP4A**
5QP4	C, S, Ro, A	Glass	53°	Magnetic	5AN	11½	5 1/32	No Coating	None	12,000	410	10,000	—	300	**5QP4**
5QP4A	C, S, Ro, A	Glass	53°	Magnetic	5AN	11½	5 1/32	No Coating	None	12,000	700	10,000	—	300	**5QP4A**
5TP4	C, S, Ro, A	Glass	50°	Electro.	12C	12⅛	5⅛	100–500	None	27,000	350	27,000	4900	200	**5TP4**
7AP4	C, S, Ro	Glass	55°	Electro.	5AJ	13⅞	7⅛	No Coating	None	3500	No Grid	3500	675	—	**7AP4**
7CP4	C, S, Ro	Glass	57°	Electro.	8BQ	13 13/16	7⅛	No Coating	None	8000	410	6000	1140	250	**7CP4**

7DP4	C, S, Ro	Glass	50°	Electro.	12R	14 7/16	7 5/16	400–1500	Double	8000	410	6000	1200 to 1650	250	**7DP4**
7HP4	C, S, Ro	Glass	50°	Magnetic	12N	13⅜	7 5/16	500	Double	8800	450	6000	—	250	**7HP4**
7NP4	C, S, Ro, A	Glass	35°	Electro.	14N	20⅛	7 3/16	No Coating	None	80,000	600	75,000	15K to 17K	400–600	**7NP4**
7QP4	C, S, Ro	Glass	52°	Magnetic	12D	13¼	7 5/16	No Coating	Single	10,000	410	8000	—	300	**7QP4**
7RP4	C, S, Ro, A	Glass	50°	Magnetic	12D	14 7/16	7 5/16	No Coating	None	12,000	410	9000	—	250	**7RP4**
7TP4	C, S, Ro, A	Glass	50°	Electro.	12Q	13½	7 5/16	No Coating	None	12,000	410	10,000	1170 to 1590	200	**7TP4**
7WP4	C, S, Ro, A	Glass	35°	Electro.	14N	20 1/16	7 3/16	Has Coating	None	80,000	600	75,000	15K to 17K	400–600	**7WP4**
8AP4	C, S, Ro	Metal	54°	Magnetic	12H	14⅝	8 11/16	—	Single	9000	No Grid	7000	—	—	**8AP4**
8AP4A	G, S, Ro	Metal	54°	Magnetic	12H	14⅝	8 11/16	—	Single	9000	No Grid	7000	—	—	**8AP4A**
8DP4	G, S, Re	Glass	85°	Electro.	12AB	10¾	6⅛ x 7 15/16	250-350	Single	8,000	300	6,000	15 to 315	150	**8DP4**
8XP4	G, S, Re	Glass	85°	Self Electro.	12S	11¾	6⅛ x 7 15/16	No Coating	None	22,000	550	16,000	—	300	**8XP4**
9AP4	C, S, Ro	Glass	40°	Electro.	6AL	21⅜	9⅛	No Coating	None	7000	250	7000	1190 to 1790	250	**9AP4**
9CP4	C, S, Ro	Glass	—	Magnetic	4AF	15⅞	9	No Coating	None	7000	No Grid	7000	—	—	**9CP4**
10ABP4	C, S, Re	Glass	85°	Electro.	12L	11⅞	7⅜ x 9⅞	400–850	Single	12,000	500	7500	0 to +500	300	**10ABP4**
10ABP4A	C, S, Re, A	Glass	85°	Electro.	12L	11⅞	7⅜ x 9⅞	400–850	Single	12,000	500	7500	0 to +500	300	**10ABP4A**
10ABP4B	G, S, Re, A	Glass	85°	Electro.	12L	11⅞	7⅜ x 9⅞	400-850	Single	12,000	500	7500	0 to +500	300	**10ABP4B**
10ABP4C	C, S, Re, A	Glass	85°	Electro.	12L	11⅞	7⅜ x 9⅞	400-850	Single	12,000	500	7500	0 to +500	300	**10ABP4C**

NOTES: All tubes in this section have heater ratings of 6.3 volts and 0.6 ampere unless marked ★, indicating 0.45 ampere current. Only tubes that are magnetically deflected are included.

Face-Plate Code: C—clear, Cy—cylindrical, F—frosted, G—gray, Re—rectangular, Ro—round, S—spherical, T—treated, A—aluminized.

† Design-center values.
⋇ Internal magnetic unit to be used with external tubular magnetic shield.
§ For rectangular tubes, the horizontal deflection angle is given.
★Has heater current of 0.45 ampere.

Television Picture Tubes (continued)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLE§	FOCUSING·	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING (μμf)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS*	GRID 2 VOLTS	TYPE
10ADP4★	G, S, Re	Glass	85°	Electro.	12L	11⅞	7⅝ x 9⅞	400–850	Single	12,000	500	7500	0 to +500	300	**10ADP4★**
10AEP4★	C, S, Re, A	Glass	85°	Electro.	12L	11⅞	7⅜ x 9⅞	400-850	Single	12,000	500	7500	0 to +500	300	**10AEP4★**
10BP4	C, S, Ro	Glass	50°	Magnetic	12N	18	10⅝	500–2500	Double	10,000	410	9000	—	250	**10BP4**
10BP4A	G, S, Ro	Glass	50°	Magnetic	12N	18	10⅝	500–2500	Double	10,000	410	9000	—	250	**10BP4A**
10BP4C	C, S, Ro, A	Glass	50°	Magnetic	12N	18	10⅝	500–2500	Single	10,000	410	9000	—	250	**10BP4C**
10BP4D	G, S, Ro, A	Glass	50°	Magnetic	12N	18	10⅝	500–2500	Single	10,000	410	9000	—	250	**10BP4D**
10CP4	C, S, Ro	Glass	50°	Magnetic	12N	17	10⅝	500	Double	12,000	450	9000	—	250	**10CP4**
10DP4	C, S, Ro, A	Glass	50°	Electro.	12M	18	10⅝	No Coating	None	10,000	410	9000	2900	250	**10DP4**
10EP4	C, S, Ro	Glass	50°	Magnetic	12N	18	10⅝	Has Coating	Double	12,000	410	8000	—	250	**10EP4**
10FP4	C, S, Ro, A	Glass	50°	Magnetic	12N	18	10⅝	500–2500	None	12,000	410	9000	—	250	**10FP4**

10MP4	C, S, Ro	Glass	52°	Magnetic	12G	17⅜	10⁹⁄₁₆	500–2500	Double	10,000	No Grid	9000	—	—	**10MP4**
10MP4A	G, S, Ro	Glass	52°	Magnetic	12G	17⅜	10⁹⁄₁₆	500–2500	Double	10,000	No Grid	9000	—	—	**10MP4A**
10RP4	C, S, Ro, A	Glass	50°	Electro.	12L	16¾	10⅝	750–1500	None	16,000	500	12,000 14,000	−48 to +260 −55 to +300	300 300	**10RP4**
10SP4	G, S, Ro, A	Glass	50°	Electro.	12M	17	10⅝	No Coating	None	20,000	410	12,000 14,000	1400 to 1900 1640 to 2225	200 200	**10SP4**
12AP4	C, S, Ro	Glass	40°	Electro.	6AL	25⅜	12³⁄₁₆	No Coating	None	7000	300	7000	1190 to 1790	250	**12AP4**
12CP4	C, S, Ro	Glass	—	Magnetic	4AF	18⅝	12¹⁄₁₆	No Coating	None	7000	No Grid	7000	—	—	**12CP4**
12JP4	C, S, Ro	Glass	50°	Magnetic	12D	18	12³⁄₁₆	No Coating	None	12,000	410	10,000	—	250	**12JP4**
12KP4	C, S, Ro, A	Glass	54°	Magnetic	12N	18	12⁹⁄₁₆	500–2500	None	12,000	410	11,000	—	250	**12KP4**
12KP4A	G, S, Ro, A	Glass	54°	Magnetic	12N	18	12⁹⁄₁₆	500–2500	None	12,000	410	11,000	—	250	**12KP4A**
12LP4	C, S, Ro	Glass	54°	Magnetic	12N	19⅛	12½	750–3000	Double	12,000	410	11,000	—	250	**12LP4**
12LP4A	G, S, Ro	Glass	54°	Magnetic	12N	19⅛	12½	750–3000	Double	12,000	410	11,000	—	250	**12LP4A**
12LP4C	G, S, Ro, A	Glass	54°	Magnetic	12N	19⅛	12½	750–3000	Double	12,000	410	11,000	—	250	**12LP4C**
12QP4	C, S, Ro	Glass	55°	Magnetic	12D	17⅞	12⁹⁄₁₆	No Coating	Single	12,000	410	10,000	—	250	**12QP4**

All tubes in this section have heater ratings of 6.3 volts and 0.6 ampere unless marked ★, indicating 0.45 ampere current. Only tubes that are magnetically deflected are included.

Face-Plate Code: C—clear, Cy—cylindrical, F—frosted, G—gray, Re—rectangular, Ro—round, S—spherical T—treated, A—aluminized.

† Design-center values.

⁂ Internal magnetic unit to be used with external tubular magnetic shield.

§ For rectangular tubes, the horizontal deflection angle is given.

★Has heater current of 0.45 ampere.

Television Picture Tubes (continued)

	GENERAL DESCRIPTION										RATINGS†		TYPICAL OPERATION		
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLES§	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING (μμf)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS*	GRID 2 VOLTS	TYPE
12QP4A	G, S, Ro	Glass	55°	Magnetic	12D	17⅞	12 9/16	No Coating	Single	12,000	410	10,000	—	250	12QP4A
12RP4	C, S, Ro	Glass	56°	Magnetic	12D	18	12 3/16	No Coating	Single	12,000	410	10,000	—	250	12RP4
12TP4	C, S, Ro	Glass	54°	Magnetic	12D	19⅛	12½	No Coating	Double	12,000	410	11,000	—	250	12TP4
12UP4	C, S, Ro	Metal	54°	Magnetic	12D	19	12½	—	Double	12,000	410	11,000	—	250	12UP4
12UP4A	G, S, Ro	Metal	54°	Magnetic	12D	19	12½	—	Double	12,000	410	11,000	—	250	12UP4A
12UP4B	G, T, S, Ro	Metal	54°	Magnetic	12D	19	12½	—	Single	12,000	410	11,000	—	250	12UP4B
12VP4	C, S, Ro	Glass	55°	Magnetic	12G	18⅜	12½	750–3000	Double	12,000	No Grid	11,000	—	—	12VP4
12VP4A	G, S, Ro	Glass	55°	Magnetic	12G	18⅜	12½	750–3000	Double	12,000	No Grid	11,000	—	—	12VP4A
12WP4	G, S, Ro	Glass	55°	Magnetic	9CH	18	12 9/16	750–2000	Single	12,000	No Grid	10,000	—	—	12WP4
12XP4	G, S, Ro	Glass	55°	Magnetic	—	18½	12⅛	2000	Not Ind.	9000	350	8000	—	250	12XP4

12YP4	C, S, Ro	Glass	54°	Auto-Electro.	12N	19⅛	12½	750–3000	Single	12,000	410	11,000	—	250	**12YP4**
12ZP4	C, S, Ro, A	Glass	54°	Magnetic	12N	18	12 9/16	500–2000	Single	12,000	410	11,000	—	250	**12ZP4**
12ZP4A	G, S, Ro, A	Glass	54°	Magnetic	12N	18	12 9/16	500–2000	Single	12,000	410	11,000	—	250	**12ZP4A**
14ACP4	G, S, Re, A	Glass	85°	Electro.	12L	14½	10 11/16 x 13 3/16	800–1200	Single	14,000	200	10,000	–50 to +350	125	**14ACP4**
14AEP4	G, S, Re, A	Glass	80°	Electro.	12L	13 9/16	10 11/16 x 13 3/16	800-1200	None	14,000	200	10,000	–50 to +350	110	**14AEP4**
14AJP4	G, S, Re, A	Glass	105°	Electro.	8HR	11 13/16	11 x 13 5/16	500-850	Single	11,000	500	9,000	–100 to +400	250	**14AJP4**
14ARP4	S, Re, A	Glass	85°	Electro.	12L	13½	10 11/16 x 13⅛	800-1200	None	14,000	70	10,000	–50 to +350	50	**14ARP4**
14ASP4	G, S, Re, A	Glass	105°	Electro.	8HR	11⅝	11 x 13 5/16	500-850	None	14,000	500	12,000	–50 to +350	300	**14ASP4**
14BP4	G, S, Re	Glass	65°	Magnetic	12N	17 3/16	9 13/16 x 12⅝	500–2000	Single	14,000	410	11,000	—	250	**14BP4**
14BP4A	G, T, S, Re	Glass	65°	Magnetic	12N	17 3/16	9 13/16 x 12⅝	500–2000	Single	14,000	410	11,000	—	250	**14BP4A**
14CP4	G, S, Re	Glass	65°	Magnetic	12N	17⅛	9 27/32 x 12 21/32	750–2000	Single	14,000	410	12,000	—	300	**14CP4**
14DP4	G, S, Re	Glass	65°	Magnetic	12D	17⅛	9 27/32 x 12 21/32	No Coating	Double	14,000	410	11,000	—	250	**14DP4**
14EP4	G, S, Re	Glass	65°	Magnetic	12N	16⅞	9 27/32 x 12 21/32	750–2000	Single	14,000	410	12,000	—	300	**14EP4**
14FP4	G, S, Re	Glass	65°	Magnetic	12D	16½	9 27/32 x 12 21/32	No Coating	Single	14,000	410	—	—	—	**14FP4**
14GP4	F, G, S, Re	Glass	65°	Electro.	12L	17 3/16	9 27/32 x.12 21/32	750–2000	Single	14,000	500	12,000	2170 to 2940	300	**14GP4**

All tubes in this section have heater ratings of 6.3 volts and 0.6 ampere unless marked ★, indicating 0.45 ampere current. Only tubes that are magnetically deflected are included.

Face-Plate Code: C—clear, Cy—cylindrical, F—frosted, G—gray, Re—rectangular, Ro—round, S—spherical T—treated, A—aluminized.

† Design-center values.

⋇ Internal magnetic unit to be used with external tubular magnetic shield.

§ For rectangular tubes, the horizontal deflection angle is given.

★Has heater current of 0.45 ampere.

Television Picture Tubes (continued)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLE§	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING ($\mu\mu f$)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS	GRID 2 VOLTS	TYPE
14HP4	G, S, Re	Glass	65°	Electro.	12L	$17\frac{3}{16}$	$9\frac{13}{16}$ x $12\frac{5}{8}$	750–2000	Single	14,000	410	12,000	−48 to +264	300	**14HP4**
14KP4	C, S, Re	Glass	65°	Magnetic	12N	$16\frac{25}{32}$	$9\frac{27}{32}$ x $12\frac{21}{32}$	500–2000	Single	10,000	380	9000	—	250	**14KP4**
14KP4A	G, S, Re	Glass	65°	Magnetic	12N	$16\frac{7}{8}$	$9\frac{27}{32}$ x $12\frac{21}{32}$	1200	Single	14,000	410	12,000	—	250	**14KP4A**
14NP4	G, S, Re, A	Glass	80°	Electro.	12L	$14\frac{1}{2}$	$10\frac{11}{16}$ x $13\frac{3}{16}$	800–1200	Single	14,000	500	10,000	−50 to +350	250	**14NP4**
14NP4A	G, S, Re, A	Glass	80°	Electro.	12L	$14\frac{1}{2}$	$10\frac{11}{16}$ x $13\frac{3}{16}$	800–1200	Single	14,000	500	10,000	−50 to +350	250	**14NP4A**
14QP4	G, S, Re	Glass	65°	Electro.	12L	$16\frac{17}{32}$	$9\frac{7}{8}$ x $12\frac{11}{16}$	600–1000	Single	11,000	500	9000	−50 to +250	250	**14QP4**
14QP4A	G, S, Re, A	Glass	65°	Electro.	12L	$16\frac{17}{32}$	$9\frac{7}{8}$ x $12\frac{11}{16}$	600–1000	Single	11,000	500	9000	−50 to +250	250	**14QP4A**
14RP4	G, S, Re	Glass	85°	Electro.	12L	$14\frac{1}{2}$	$10\frac{11}{16}$ x $13\frac{3}{16}$	800-1200	Single	14,000	400	10,000	−50 to +350	300	**14RP4**
14RP4A	G, S, Re, A	Glass	85°	Electro.	12L	$14\frac{1}{2}$	$10\frac{11}{16}$ x $13\frac{3}{16}$	800–1200	Single	14,000	400	10,000	−50 to +350	300	**14RP4A**
14SP4	G, S, Re, A	Glass	79°	Electro.	12L	$14\frac{9}{16}$	$10\frac{11}{16}$ x $13\frac{3}{16}$	900–1200	Single	14,000	500	12,000	−48 to +264	300	**14SP4**
14UP4	G, S, Re, A	Glass	65°	Magnetic	12D	$17\frac{5}{32}$	$9\frac{7}{8}$ x $12\frac{11}{16}$	No Coating	None	14,000	500	12,000	—	300	**14UP4**
14WP4	G, S, Re, A	Glass	85°	Electro.	12L	$13\frac{9}{16}$	$10\frac{11}{16}$ x $13\frac{3}{16}$	800–1200	None	14,000	500	12,000	−50 to +350	300	**14WP4**

14XP4★	G, S, Re	Glass	79°	Electro.	12L	14½	10¹¹⁄₁₆ x 13³⁄₁₆	1100–1500	Single	15,000	400	12,000	−50 to +350	300	**14XP4★**
14XP4A★	G, S, Re, A	Glass	79°	Electro.	12L	14½	10¹¹⁄₁₆ x 13³⁄₁₆	1100–1500	Single	15,000	400	12,000	−50 to +350	300	**14XP4A★**
14ZP4	G, S, Re, A	Glass	85°	Electro.	12L	13⁹⁄₁₆	10¹¹⁄₁₆ x 13³⁄₁₆	800–1200	None	14,000	450	12,000	0 to +450	300	**14ZP4**
15AP4	C, S, Ro	Glass	52°	Magnetic	12D	20⅞	15¾	No Coating	None	15,000	410	12,000	—	250	**15AP4**
15CP4	C, S, Ro	Glass	50°	Magnetic	12D	21⅞	15¾	No Coating	Double	15,000	410	9000–15,000	—	250	**15CP4**
15DP4	C, S, Ro	Glass	57°	Magnetic	12D	20⅞	15¾	No Coating	Single	15,000	410	13,000	—	250	**15DP4**
15EP4	C, S, Ro	Glass	52°	Magnetic	—	22¾	15⁷⁄₁₆	500–2000	Not Ind.	10,000	380	9000	—	250	**15EP4**
16AP4	C, S, Ro	Metal	53°	Magnetic	12D	22⅝	16	—	Double	14,000	410	9000–12,000	—	300	**16AP4**
16AP4A	G, S, Ro	Metal	53°	Magnetic	12D	22⅝	16	—	Double	14,000	410	12,000	—	300	**16AP4A**
16AP4B	G, F, S, Ro	Metal	53°	Magnetic	12D	22⅝	16	—	Double	14,000	410	12,000	—	300	**16AP4B**
16ABP4	G, S, Re	Glass	65°	Auto-Electro.	12N	19⅛	11⅝ x 14⅞	750–1500	Single	16,000	500	12,000–14,000	—	300	**16ABP4**
16ACP4	C, S, Ro	Glass	60°	Auto-Electro.	12N	21⅛	16	2000	Single	14,000	410	12,000–13,000	—	250	**16ACP4**
16AEP4	G, S, Re	Glass	65°	Electro.	12L	19⅛	11¼ x 14⅞	750–1500	Single	16,000	410	12,000–14,000	−64 to +350	300	**16AEP4**
16AFP4	C, Cy, Re, A	Glass	65°	Electro.	12L	19⁵⁄₃₂	11½ x 14¾	Has Coating	None	16,000	410	12,000	0	250	**16AFP4**
16CP4	C, S, Ro	Glass	52°	Magnetic	12D	21⅞	15¹⁵⁄₁₆	No Coating	Double	15,000	410	12,000	—	250	**16CP4**

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† Design-center values.
⁎ Internal magnetic unit to be used with external tubular magnetic shield.
§ For rectangular tubes, the horizontal deflection angle is given.
★ Has heater current of 0.45 ampere.

Television Picture Tubes (continued)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLE§	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING (μμf)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS	GRID 2 VOLTS	TYPE
16DP4	C, S, Ro	Glass	60°	Magnetic	12D	21	16	No Coating	Double	15,000	410	9000–12,000	—	250	**16DP4**
16DP4A	G, S, Ro	Glass	60°	Magnetic	12D	21	16	No Coating	Double	15,000	410	9000–12,000	—	250	**16DP4A**
16EP4	C, S, Ro	Metal	60°	Magnetic	12D	20	16	—	Double	14,000	410	12,000	—	300	**16EP4**
16EP4A	G, S, Ro	Metal	60°	Magnetic	12D	20	16	—	Double	14,000	410	12,000	—	300	**16EP4A**
16EP4B	G, T, S, Ro	Metal	60°	Magnetic	12D	20	16	—	Single	14,000	410	12,000	—	300	**16EP4B**
16FP4	C, S, Ro	Glass	62°	Magnetic	12D	20⅝	16⅜	No Coating	Single	16,000	410	12,000	—	300	**16FP4**
16GP4	G, S, Ro	Metal	70°	Magnetic	12D	17¹¹⁄₁₆	16	—	Single	14,000	410	12,000	—	300	**16GP4**
16GP4A	C, S, Ro	Metal	70°	Magnetic	12D	17¹¹⁄₁₆	16	—	Single	14,000	410	12,000	—	300	**16GP4A**
16GP4B	G, F, S, Ro	Metal	70°	Magnetic	12D	17¹¹⁄₁₆	16	—	Single	14,000	410	12,000	—	300	**16GP4B**
16GP4C	C, F, S, Ro	Metal	70°	Magnetic	12D	17¹¹⁄₁₆	16	—	Single	14,000	410	12,000	—	300	**16GP4C**

16HP4	C, S, Ro	Glass	60°	Magnetic	12N	21⅝	16	1500–3500	Double	14,000	410	12,000	—	300	**16HP4**
16HP4A	G, S, Ro	Glass	60°	Magnetic	12N	21⅝	16	1500–3500	Double	14,000	410	12,000	—	300	**16HP4A**
16JP4	C, S, Ro	Glass	60°	Magnetic	12N	21⅛	16⅜	750–2000	Double	14,000	410	11,000	—	250	**16JP4**
16JP4A	G, S, Ro	Glass	60°	Magnetic	12N	21⅛	16⅜	750–2000	Double	14,000	410	11,000	—	250	**16JP4A**
16KP4	G, S, Re	Glass	65°	Magnetic	12N	19⅛	11⅝ x 14⅞	750–1500	Single	16,000	410	12,000–16,000	—	300	**16KP4**
16KP4A	G, S, Re, A	Glass	65°	Magnetic	12N	19⅛	11⅝ x 14⅞	750–1500	Single	16,000	410	14,000	—	300	**16KP4A**
16LP4	C, S, Ro	Glass	52°	Magnetic	12N	22⅝	16	1500–3500	Double	14,000	410	12,000	—	300	**16LP4**
16LP4A	G, S, Ro	Glass	52°	Magnetic	12N	22⅝	16	750–2000	Double	14,000	410	12,000–14,000	—	300	**16LP4A**
16MP4	C. S, Ro	Glass	60°	Magnetic	12N	22⅛	16¼	1500–3500	Double	14,000	410	12,000	—	300	**16MP4**
16MP4A	G, S, Ro	Glass	60°	Magnetic	12N	22⅛	16¼	1500–3500	Double	14,000	410	12,000	—	300	**16MP4A**
16QP4	G, S, Re	Glass	65°	Magnetic	12D	19⅛	11$\frac{11}{16}$ x 14$\frac{15}{16}$	No Coating	Double	16,000	410	14,000	—	250	**16QP4**
16RP4	G, S, Re	Glass	65°	Magnetic	12N	19⅛	11⅝ x 14⅞	750–1500	Single	16,000	410	12,000–16,000	—	300	**16RP4**
16RP4A	G, S, Re, A	Glass	65°	Magnetic	12N	19⅛	11⅝ x 14⅞	750–1500	Single	16,000	410	12,000–16,000	—	300	**16RP4A**
16SP4	C, S, Ro	Glass	70°	Magnetic	12N	17$\frac{11}{16}$	16	1500–3500	Double	14,000	410	12,000	—	300	**16SP4**
16SP4A	G, S, Ro	Glass	70°	Magnetic	12N	17$\frac{11}{16}$	16	1500–3500	Double	14,000	400	12,000	—	300	**16SP4A**

NOTES: All tubes in this section have heater ratings of 6.3 volts and 0.6 ampere unless marked ★, indicating 0.45 ampere current. Only tubes that are magnetically deflected are included.

Face-Plate Code: C—clear, Cy—cylindrical, F—frosted, G—gray, Re—rectangular, Ro—round, S—spherical, T—treated, A—aluminized.

† Design-center values.
⋇ Internal magnetic unit to be used with external tubular magnetic shield.
§ For rectangular tubes, the horizontal deflection angle is given.
★Has heater current of 0.45 ampere.

Television Picture Tubes (continued)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLE§	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING (μμf)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS*	GRID 2 VOLTS	TYPE
16TP4	G, S, Re	Glass	65°	Magnetic	12N	18½	11⅝ x 14⅞	750–2000	Single	14,000	410	12,000–14,000	—	300	**16TP4**
16UP4	G, S, Re	Glass	65°	Magnetic	12D	18⅝	11⅝ x 14⅞	No Coating	Single	15,000	410	12,000	—	300	**16UP4**
16VP4	G, S, Ro	Glass	70°	Magnetic	12D	17⁹⁄₁₆	16	No Coating	Single	15,000	410	12,000	—	250	**16VP4**
16WP4	G, S, Ro	Glass	70°	Magnetic	12D	18⅛	16	No Coating	Double	15,000	410	12,000	—	250	**16WP4**
16WP4A	G, S, Ro	Glass	70°	Magnetic	12N	18⅛	16	750–1500	Double	16,000	410	12,000–16,000	—	250	**16WP4A**
16XP4	G, S, Re	Glass	65°	Magnetic	12D	19⅛	11⅝ x 14⅞	No Coating	Double	15,000	410	12,000	—	250	**16XP4**
16YP4	G, S, Re	Glass	70°	Magnetic	12N	17¹¹⁄₁₆	16	750–2000	Single	14,000	410	12,000	—	300	**16YP4**
16ZP4	G, S, Ro	Glass	52°	Magnetic	12N	22⅝	16	750–1500	Double	16,000	410	12,000	—	300	**16ZP4**
17AP4	G, S, Re	Glass	65°	Magnetic	12N	19	12⅜ x 15½	750–2000	Single	16,000	410	12,000	—	300	**17AP4**

17ASP4	C, S, Re	Glass	65°	Magnetic	12N	19⅞	12⅜ x 15½	1100	Single	14,000	410	12,000	—	250	**17ASP4**
17ATP4	G, S, Re	Glass	85°	Electro.	12L	16¼	12⅜ x 15½	750–1500	Single	16,000	500	14,000 12,000	−55 to +300 −50 to +265	300 300	**17ATP4**
17ATP4A	G, S, Re, A	Glass	85°	Electro.	12L	16¼	12⅜ x 15½	750–1500	Single	16,000	500	14,000 12,000	−55 to +300 −50 to +265	300 300	**17ATP4A**
17AVP4	G, S, Re	Glass	85°	Electro.	12L	16	$12\frac{15}{32}$ x $15\frac{9}{16}$	1200–1500	Single	16,000	500	12,000	−48 to +264	300	**17AVP4**
17AVP4A	G, S, Re, A	Glass	85°	Electro.	12L	16	$12\frac{15}{32}$ x $15\frac{9}{16}$	1200–1500	Single	16,000	500	12,000	−48 to +264	300	**17AVP4A**
17BP4	G, S, Re	Glass	65°	Magnetic	12D	19⅝	12⅜ x 15½	No Coating	Single	16,000	410	12,000	—	300	**17BP4**
17BP4A	G, S, Re	Glass	65°	Magnetic	12N	19⅝	$12\frac{13}{32}$ x 15½	750–1500	Single	16,000	410	12,000	—	300	**17BP4A**
17BP4B	G, S, Re, A	Glass	65°	Magnetic	12N	19⅝	12⅜ x 15½	750–1500	Single	16,000	410	14,000	—	250	**17BP4B**
17BP4C	G, T, S, Re	Glass	65°	Magnetic	12N	19⅝	$12\frac{13}{32}$ x 15½	750–1500	Single	16,000	410	12,000	—	300	**17BP4C**
17BJP4	G, S, Re, A	Glass	80°	Electro.	12L	$14\frac{15}{16}$	12⅜ x 15½	1200–1500	None	16,000	500	14,000	−55 to +300	300	**17BJP4**
17BKP4★	G, S, Re	Glass	85°	Electro.	12L	16	$12\frac{13}{16}$ x 15½	1200-1500	Single	16,000	500	14,000	−56 to +310	300	**17BKP4★**
17BKP4A★	G, S, Re, A	Glass	85°	Electro.	12L	16	$12\frac{13}{16}$ x 15½	1200-1500	Single	16,000	500	14,000	−56 to +310	300	**17BKP4A★**
17BMP4	G, S, Re, A	Glass	80°	Electro.	12L	16	12⅜ x 15½	750-1500	Single	18,000	200	12,000	−50 to +265	110	**17BMP4**
17BNP4	G, S, Re, A	Glass	80°	Electro.	12L	15	12⅜ x 15½	750-1500	None	18,000	200	12,000	−50 to +350	110	**17BNP4**

NOTES: All tubes in this section have heater ratings of 6.3 volts and 0.6 ampere unless marked ★, indicating 0.45 ampere current. Only tubes that are magnetically deflected are included.

Face-Plate Code: C—clear, Cy—cylindrical, F—frosted, G—gray, Re—rectangular, Ro—round, S—spherical, T—treated, A—aluminized.

† Design-center values.
⋇ Internal magnetic unit to be used with external tubular magnetic shield.
§ For rectangular tubes, the horizontal deflection angle is given.
★ Has heater current of 0.45 ampere.

Television Picture Tubes (continued)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLE§	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING ($\mu\mu f$)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS	GRID 2 VOLTS	TYPE
17BSP4★	G, S, Re, A	Glass	85°	Electro.	12L	14⅝	$12\frac{13}{32}$ x 15½	1200-1500	None	16,000	500	14,000	−50 to +350	300	**17BSP4★**
17BUP4	G, S, Re, A	Glass	85°	Electro.	12L	15⅝	$12\frac{13}{32}$ x 15½	1200-1500	Single	20,000	500	12,000	−48 to +264	300	**17BUP4**
17BVP4	G, S, Re, A	Glass	105°	Electro.	7FA	$13\frac{9}{16}$	12.85 x 15.725	1000-1500	Single	17,600	550	14,000	−50 to +350	300	**17BVP4**
17BZP4	G, S, Re, A	Glass	105°	Electro.	8HR	$12\frac{13}{16}$	12⅞ x 15¾	800-1500	None	16,000	500	14,000	0 to 400	300	**17BZP4**
17CP4	G, F, S, Re	Metal	66°	Magnetic	12D	19	12⅜ x $16\frac{1}{16}$	—	Single	16,000	410	12,000	—	300	**17CP4**
17CP4A	G, S, Re	Metal	66°	Magnetic	12D	19	12⅜ x $16\frac{1}{16}$	—	Single	16,000	410	12,000 14,000	— —	300 300	**17CP4A**
17CDP4★	G, S, Re, A	Glass	105°	Electro.	8HR	$12\frac{13}{16}$	12⅞ x 15¾	800-1500	None	16,000	500	14,000	0 to 400	300	**17CDP4★**
17CEP4★	G, S, Re, A	Glass	85°	Electro.	12L	15⅜	12⅞ x 15¾	1200-1500	None	16,000	500	14,000	−50 to +350	300	**17CEP4★**
17CFP4	G, S, Re, A	Glass	85°	Electro.	12L	15⅜	12⅞ x 15¾	1200-1500	None	16,000	500	14,000	−50 to +350	300	**17CFP4**
17FP4	G, S, Re	Glass	65°	Electro.	12L	19⅝	12⅜ x 15½	500–750	Single	18,000	410	12,000 16,000	2300 to 3100 3100 to 4100	300 300	**17FP4**

17FP4A	G, S, Re	Glass	65°	Electro.	12L	19⅝	12⅜ x 15½	750–2000	Single	18,000	410	12,000	2300 to 3100	300	**17FP4A**
17GP4	G, F, S, Re	Metal	66°	Electro.	12M	19 5/16	12⅜ x 16 1/16	—	Single	16,000	500	12,000	2290 to 3100	300	**17GP4**
17HP4	G, S, Re	Glass	65°	Electro.	12L	19 9/16	12⅜ x 15½	750–1500	Single	16,000	500	14,000–16,000	−56 to +310	300	**17HP4**
17HP4A	G, T, S, Re	Glass	65°	Electro.	12L	19 9/16	12 13/32 x 15½	750–1500	Single	16,000	500	14,000–16,000	−56 to +310	300	**17HP4A**
17HP4B	G, S, Re, A	Glass	65°	Electro.	12L	19 9/16	12 13/32 x 15½	750–1500	Single	16,000	500	14,000	−56 to +310	300	**17HP4B**
17JP4	G, S, Re	Glass	65°	Magnetic	12N	19⅝	12 13/32 x 15½	500–750	Single	18,000	410	16,000	—	300	**17JP4**
17KP4	G, S, Re	Glass	65°	Auto–Electro.	12D	19⅝	12⅜ x 15½	1000–1500	Single	16,000	500	12,000	—	300	**17KP4**
17KP4A	G, S, Re, A	Glass	65°	Auto–Electro.	12D	19⅝	12⅜ x 15½	1000–1500	Single	16,000	500	12,000	—	300	**17KP4A**
17LP4	G, Cy, Re	Glass	65°	Electro.	12L	19 9/16	12⅜ x 15½	750–2000	Single	16,000	500	12,000	−48 to +260	300	**17LP4**
17LP4A	G, Cy, Re, A	Glass	65°	Electro.	12L	19 9/16	12⅜ x 15½	750–1500	Single	16,000	500	14,000	−56 to +310	300	**17LP4A**
17QP4	G, Cy, Re	Glass	65°	Magnetic	12N	19 9/16	12⅜ x 15½	750–2000	Single	16,000	410	12,000	—	300	**17QP4**
17QP4A	G, Cy, Re, A	Glass	65°	Magnetic	12N	19 9/16	12⅜ x 15½	750–1500	Single	18,000	500	14,000	—	300	**17QP4A**
17RP4	G, S, Re	Glass	66°	Electro.	12L	19⅝	12⅜ x 15½	750–1500	Single	16,000	500	14,000	−56 to +308	300	**17RP4**
17RP4C	G, S, Re, A	Glass	66°	Electro.	12L	19⅝	12⅜ x 15½	750-1500	Single	16,000	500	14,000	−56 to +308	300	**17RP4C**
17SP4	G, Cy, Re	Glass	66°	Auto–Electro.	12N	19 9/16	12⅜ x 15½	500–750	Single	14,000	410	12,000	—	250	**17SP4**

NOTES: All tubes in this section have heater ratings of 6.3 volts and 0.6 ampere unless marked ★, indicating 0.45 ampere current. Only tubes that are magnetically deflected are included.

Face-Plate Code: C—clear, Cy—cylindrical, F—frosted, G—gray, Re—rectangular, Ro—round, S—spherical, T—treated, A—aluminized.

† Design-center values.
⋇ Internal magnetic unit to be used with external tubular magnetic shield.
§ For rectangular tubes, the horizontal deflection angle is given.
★Has heater current of 0.45 ampere.

Television Picture Tubes (continued)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLE§	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING ($\mu\mu f$)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS	GRID 2 VOLTS	TYPE
17TP4	G, F, S, Re	Metal	66°	Electro.	12M	$19\frac{5}{16}$	12⅜ x $16\frac{1}{16}$	—	Single	16,000	500	14,000 16,000	−55 to +300 −65 to +350	300 300	**17TP4**
17UP4	G, Cy, Re	Glass	70°	Magnetic	12N	$19\frac{9}{16}$	12⅜ x 15½	750–1500	Single	14,000	410	12,000	—	250	**17UP4**
17VP4	G, Cy, Re	Glass	66°	Electro.	12L	$19\frac{9}{16}$	$12\frac{13}{32}$ x 15½	750–1500	Single	16,000	500	14,000	−56 to +310	300	**17VP4**
17VP4B	G, Cy, Re, A	Glass	66°	Electro.	12L	$19\frac{9}{16}$	$12\frac{13}{32}$ x 15½	750–1500	Single	16,000	500	14,000	—	300	**17VP4B**
17YP4	G, Cy, Re	Glass	65°	Magnetic	12N	$19\frac{9}{16}$	$12\frac{13}{32}$ x 15½	500–750	Single	18,000	500	16,000	—	300	**17YP4**
19AP4	C, S, Ro	Metal	66°	Magnetic	12D	22	18¾	—	Single	16,000	410	12,000	—	300	**19AP4**
19AP4A	G, S, Ro	Metal	66°	Magnetic	12D	22	18¾	—	Single	16,000	410	12,000	—	300	**19AP4A**
19AP4B	G, F, S, Ro	Metal	66°	Magnetic	12D	22	18¾	—	Single	16,000	410	12,000	—	300	**19AP4B**
19AP4C	G, S, Ro, A	Metal	66°	Magnetic	12D	22	18¾	—	Single	16,000	410	15,000	—	300	**19AP4C**
19AP4D	C, F, S, Ro	Metal	66°	Magnetic	12D	22	18¾	—	Single	16,000	410	15,000	—	300	**19AP4D**

19DP4	C, S, Ro	Glass	66°	Magnetic	12N	$21\frac{7}{8}$	19	750,2000	Double	17,000	410	13,000	—	250	**19DP4**
19DP4A	G, S, Ro	Glass	66°	Magnetic	12N	$21\frac{7}{8}$	19	750–2500	Double	17,000	410	13,000	—	250	**19DP4A**
19EP4	G, S, Re	Glass	65°	Magnetic	12D	$21\frac{1}{2}$	$13\frac{7}{32}$ x $17\frac{1}{8}$	No Coating	Single	19,000	410	13,000	—	250	**19EP4**
19FP4	G, S, Ro	Glass	66°	Magnetic	12D	$22\frac{1}{2}$	19	No Coating	Double	19,000	410	13,000	—	250	**19FP4**
19GP4	G, S, Ro	Glass	66°	Magnetic	12D	$21\frac{3}{4}$	19	No Coating	Single	19,000	410	13,000	—	250	**19GP4**
19JP4	G, S, Re	Glass	66°	Magnetic	12D	$21\frac{3}{16}$	$13\frac{5}{16}$ x $17\frac{3}{16}$	No Coating	Single	18,000	410	12,000	—	300	**19JP4**
19QP4	G, S, Re	Glass	66°	Electro.	12L	$21\frac{1}{2}$	$13\frac{5}{16}$ x $17\frac{3}{16}$	500–750	Single	18,000	410	12,000	−50 to +350	300	**19QP4**
20BP4	C, S, Ro	Glass	54°	Magnetic	12D	$28\frac{3}{4}$	$20\frac{3}{8}$	No Coating	None	16,500	750	10,000–15,000	—	250	**20BP4**
20CP4	G, S, Re	Glass	66°	Magnetic	12D	$21\frac{13}{16}$	$15\frac{1}{16}$ x $18\frac{13}{16}$	No Coating	Single	18,000	410	12,000	—	300	**20CP4**
20CP4A	G, S, Re	Glass	66°	Magnetic	12N	$21\frac{13}{16}$	$15\frac{1}{16}$ x $18\frac{13}{16}$	500–750	Single	18,000	410	12,000	—	300	**20CP4A**
20CP4B	G, S, Re, A	Glass	66°	Magnetic	12D	$21\frac{13}{16}$	$15\frac{1}{16}$ x $18\frac{13}{16}$	No Coating	Single	18,000	410	12,000	—	300	**20CP4B**
20CP4C	G, T, S, Re	Glass	66°	Magnetic	12D	$21\frac{13}{16}$	$15\frac{1}{16}$ x $18\frac{13}{16}$	No Coating	Single	18,000	410	14,000–18,000	—	300	**20CP4C**
20CP4D	G, S, Re, A	Glass	66°	Magnetic	12N	$21\frac{13}{16}$	$15\frac{1}{16}$ x $18\frac{13}{16}$	500–750	Single	18,000	410	12,000	—	300	**20CP4D**
20DP4	G, S, Re	Glass	65°	Magnetic	12D	$21\frac{3}{4}$	$15\frac{1}{16}$ x $18\frac{13}{16}$	No Coating	Single	18,000	410	12,000	—	300	**20DP4**
20DP4A	G, S, Re	Glass	65°	Magnetic	12N	$21\frac{3}{4}$	$15\frac{1}{16}$ x $18\frac{13}{16}$	500–750	Single	18,000	410	12,000	—	300	**20DP4A**

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† Design-center values.

⁎ Internal magnetic unit to be used with external tubular magnetic shield.

§ For rectangular tubes, the horizontal deflection angle is given.

★Has heater current of 0.45 ampere.

Television Picture Tubes (continued)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLE§	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING ($\mu\mu f$)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS	GRID 2 VOLTS	TYPE
20DP4B	G, S, Re, A	Glass	66°	Magnetic	12D	$22\frac{1}{8}$	$15\frac{1}{8} \times 18\frac{7}{8}$	No Coating	Single	18,000	410	16,000	—	300	**20DP4B**
20DP4C	G, S, Re, A	Glass	66°	Magnetic	12N	$22\frac{1}{8}$	$15\frac{1}{8} \times 18\frac{7}{8}$	500–750	Single	18,000	410	16,000	—	300	**20DP4C**
20FP4	G. S, Re	Glass	66°	Electro.	12M	$22\frac{1}{8}$	$15\frac{1}{16} \times 18\frac{13}{16}$	No Coating	Single	18,000	410	12,000	2300 to 3200	300	**20FP4**
20GP4	G, S, Re	Glass	66°	Electro.	12L	$22\frac{1}{8}$	$15\frac{1}{16} \times 18\frac{13}{16}$	500–750	Single	18,000	500	14,000	2750 to 3740	300	**20GP4**
20HP4	G, S, Re	Glass	66°	Electro.	12M	$22\frac{1}{8}$	$15\frac{1}{16} \times 18\frac{13}{16}$	No Coating	Single	16,000	500	14,000	−56 to +310	300	**20HP4**
20HP4A	G, S, Re	Glass	66°	Electro.	12L	$22\frac{1}{8}$	$15\frac{1}{16} \times 18\frac{13}{16}$	750–1500	Single	16,000	500	14,000	−56 to +310	300	**20HP4A**
20HP4B	G, T, S, Re	Glass	66°	Electro.	12M	$22\frac{1}{8}$	$15\frac{1}{16} \times 18\frac{13}{16}$	No Coating	Single	16,000	500	14,000	−56 to +310	300	**20HP4B**
20HP4C	G, S, Re, A	Glass	66°	Electro.	12M	$22\frac{1}{8}$	$15\frac{1}{8} \times 18\frac{7}{8}$	No Coating	Single	16,000	500	14,000	−56 to +310	300	**20HP4C**
20HP4D	G, S, Re, A	Glass	66°	Electro.	12L	$22\frac{1}{8}$	$15\frac{1}{8} \times 18\frac{7}{8}$	570–1500	Single	16,000	500	14,000	−56 to +310	300	**20HP4D**
20JP4	G, S, Re	Glass	65°	Auto–Electro.	12P	$22\frac{1}{8}$	$15\frac{1}{16} \times 18\frac{13}{16}$	500–750	Single	18,000	500	12,000	—	300	**20JP4**

20LP4	G, S, Re	Glass	66°	Electro.	12L	22⅛	15¹⁄₁₆ x 18¹³⁄₁₆	750–1500	Single	16,000	500	14,000	0	300	**20LP4**
20MP4	G, S, Re	Glass	66°	Electro.	12L	22⅛	15⅛ x 18⅞	500–750	Single	16,000	500	14,000	−55 to +300	300	**20MP4**
21AP4	G, F, S, Re	Metal	66°	Magnetic	12D	22⅝	15⁷⁄₁₆ x 19²⁷⁄₃₂	—	Single	18,000	500	14,000–18,000	—	300	**21AP4**
21ACP4	G, S, Re	Glass	85°	Magnetic	12N	20⅜	16½ x 20⅜	2000–2500	Single	20,000	500	16,000	—	300	**21ACP4**
21ACP4A	G, S, Re, A	Glass	85°	Magnetic	12N	20⅜	16½ x 20⅜	2000–2500	Single	20,000	500	16,000	—	300	**21ACP4A**
21AFP4	G, S, Re	Glass	65°	Electro.	12M	23⅜	15¹¹⁄₁₆ x 20⁷⁄₁₆	No Coating	Single	18,000	500	16,000	−64 to +350	300	**21AFP4**
21ALP4	G, S, Re	Glass	85°	Electro.	12L	20⁷⁄₁₆	16⁹⁄₁₆ x 20⁷⁄₁₆	500–750	Single	18,000	500	14,000	−55 to +300	300	**21ALP4**
21ALP4A	G, S, Re, A	Glass	85°	Electro.	12L	20⁷⁄₁₆	16⁹⁄₁₆ x 20⁷⁄₁₆	500–750	Single	18,000	500	14,000	−55 to +300	300	**21ALP4A**
21ALP4B	G, S, Re, A	Glass	85°	Electro.	12L	20⁷⁄₁₆	16⁹⁄₁₆ x 20⁷⁄₁₆	500–750	Single	20,000	500	14,000	−55 to +300	300	**21ALP4B**
21AMP4	G, S, Re	Glass	85°	Magnetic	12N	20⁷⁄₁₆	16⁹⁄₁₆ x 20⁷⁄₁₆	2000–2500	Single	18,000	500	16,000	—	300	**21AMP4**
21AMP4A	G, S, Re, A	Glass	85°	Magnetic	12N	20⁷⁄₁₆	16⁹⁄₁₆ x 20⁷⁄₁₆	2000–2500	Single	18,000	500	16,000	—	300	**21AMP4A**
21AMP23A	G, S, Re, A	Glass	85°	Magnetic	12N	20⁷⁄₁₆	16½ x 20⅜	500–750	Single	18,000	500	16,000	—	300	**21AMP23A**
21ANP4	G, S, Re	Glass	85°	Electro.	12M	20⁷⁄₁₆	16⁹⁄₁₆ x 20⁷⁄₁₆	No Coating	Single	18,000	500	14,000	−55 to +300	300	**21ANP4**
21ANP4A	G, S, Re, A	Glass	85°	Electro.	12M	20⁷⁄₁₆	16⁹⁄₁₆ x 20⁷⁄₁₆	No Coating	Single	18,000	500	14,000	−55 to +300	300	**21ANP4A**
21AQP4	G, S, Re	Glass	85°	Magnetic	12D	20⁷⁄₁₆	16⁹⁄₁₆ x 20⁷⁄₁₆	No Coating	Single	18,000	500	16,000	—	300	**21AQP4**

NOTES: All tubes in this section have heater ratings of 6.3 volts and 0.6 ampere unless marked ★, indicating 0.45 ampere current. Only tubes that are magnetically deflected are included.

Face-Plate Code: C—clear, Cy—cylindrical, F—frosted, G—gray, Re—rectangular, Ro—round, S—spherical, T—treated, A—aluminized.

† Design-center values.
⋇ Internal magnetic unit to be used with external tubular magnetic shield.
§ For rectangular tubes, the horizontal deflection angle is given.
★ Has heater current of 0.45 ampere.

Television Picture Tubes (continued)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLE§	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING ($\mu\mu f$)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS	GRID 2 VOLTS	TYPE
21AQP4A	G, S, Re, A	Glass	85°	Magnetic	12D	$20\frac{7}{16}$	$16\frac{9}{16}$ x $20\frac{7}{16}$	No Coating	Single	18,000	500	16,000	—	300	**21AQP4A**
21ARP4	G, S, Re	Glass	65°	Int. Magnetic*	12N	$23\frac{13}{32}$	$15\frac{11}{16}$ x $20\frac{3}{8}$	500–750	Internal	20,000	500	16,000	—	300	**21ARP4**
21ARP4A	G, S, Re, A	Glass	65°	Int. Magnetic*	12N	$23\frac{13}{32}$	$15\frac{11}{16}$ x $20\frac{3}{8}$	500–750	None	20,000	500	16,000	—	300	**21ARP4A**
21ASP4	G, S, Re	Glass	66°	Electro.	12M	$22\frac{5}{8}$	$15\frac{1}{16}$ x $18\frac{13}{16}$	No Coating	Single	18,000	410	16,000	−64 to +352	300	**21ASP4**
21ATP4	G, S, Re, A	Glass	85°	Electro.	12L	$20\frac{3}{8}$	$16\frac{9}{16}$ x $20\frac{7}{16}$	1200–1500	Single	18,000	500	16,000	−64 to +350	300	**21ATP4**
21ATP4A	G, S, Re, A	Glass	85°	Electro.	12L	$20\frac{3}{8}$	$16\frac{9}{16}$ x $20\frac{7}{16}$	1200–1500	Single	20,000	500	16,000	−64 to +350	300	**21ATP4A**
21ATP4B	G, S, Re	Glass	85°	Electro.	12L	$20\frac{3}{8}$	$16\frac{9}{16}$ x $20\frac{7}{8}$	1200–1500	Single	18,000	500	16,000	−64 to +350	300	**21ATP4B**
21AUP4	G, S, Re	Glass	67°	Electro.	12L	$23\frac{13}{32}$	$16\frac{1}{2}$ x $20\frac{3}{8}$	2000–2500	Single	18,000	500	18,000	−72 to +396	300	**21AUP4**
21AUP4A	G, S, Re, A	Glass	67°	Electro.	12L	$23\frac{13}{32}$	$16\frac{1}{2}$ x $20\frac{3}{8}$	2000–2500	Single	18,000	500	18,000	−72 to +396	300	**21AUP4A**
21AUP4B	G, S, Re, A	Glass	67°	Electro.	12L	$23\frac{13}{32}$	$16\frac{1}{2}$ x $20\frac{3}{8}$	500–750	Single	20,000	500	18,000	−72 to +396	300	**21AUP4B**

21AVP4	G, S, Re	Glass	67°	Electro.	12L	$23\frac{13}{32}$	16½ x 20⅜	1200–1500	Single	18,000	500	18,000	−72 to +396	300	**21AVP4**
21AVP4A	G, S, Re, A	Glass	67°	Electro.	12L	$23\frac{13}{32}$	16½ x 20⅜	1200–1500	Single	18,000	500	18,000	−72 to +396	300	**21AVP4A**
21AVP4B	G, S, Re, A	Glass	67°	Electro.	12L	$23\frac{13}{32}$	16½ x 20⅜	1200–1500	Single	20,000	500	18,000	−72 to +396	300	**21AVP4B**
21AWP4	G, S, Re, A	Glass	67°	Magnetic	12N	$23\frac{13}{32}$	$16\frac{9}{16}$ x $20\frac{7}{16}$	750–1500	Single	18,000	500	16,000	—	300	**21AWP4**
21AYP4	G, S, Re	Glass	66°	Electro.	12L	22⅝	$15\frac{1}{16}$ x $18\frac{13}{16}$	750– 2000	Single	18,000	410	16,000	−64 to +352	300	**21AYP4**
21BAP4	G, S, Re	Glass	85°	Electro.	12L	20⅜	16½ x 20⅜	2000–2500	None	20,000	500	16,000	0 to 500	300	**21BAP4**
21BCP4	G, S, Re, A	Glass	65°	Electro.	12L	$23\frac{13}{32}$	$15\frac{11}{16}$ x 20⅜	500–750	None	20,000	500	16,000	+50 to +550	300	**21BCP4**
21BDP4	G, S, Re, A	Glass	67°	Electro.	12L	$23\frac{13}{32}$	16½ x 20⅜	500–750	None	20,000	500	16,000	+50 to +550	300	**21BDP4**
21BNP4	G, S, Re, A	Glass	85°	Electro.	12L	20⅜	16½ x 20⅜	2000–2500	None	20,000	500	16,000	0 to 500	300	**21BNP4**
21BSP4	G, S, Re, A	Glass	85°	Magnetic	12N	20⅜	16½ x 20⅜	2000–2500	Single	20,000	500	16,000	—	300	**21BSP4**
21BTP4	G, S, Re, A	Glass	85°	Electro.	12L	20⅜	16½ x 20⅜	2000–2500	Single	20,000	500	16,000	−64 to +352	300	**21BTP4**
21CBP4	G, S, Re, A	Glass	85°	Electro.	12L	18⅜	16½ x 20⅜	2200–2900	None	18,000	500	14,000	−55 to +300	300	**21CBP4**
21CBP4A	G, S, Re, A	Glass	85°	Electro.	12L	18⅜	16½ x 20⅜	2200–2900	None	20,000	500	16,000	0 to +450	300	**21CBP4A**
21CDP4★	G, S, Re	Glass	85°	Electro.	12L	20⅜	16½ x 20⅜	2000-2500	Single	20,000	500	16,000	−64 to +352	300	**21CDP4★**
21CDP4A★	G, S, Re, A	Glass	85°	Electro.	12L	20⅜	16½ x 20⅜	2000-2500	Single	20,000	500	16,000	−64 to +352	300	**21CDP4A★**

NOTES: All tubes in this section have heater ratings of 6.3 volts and 0.6 ampere unless marked ★, indicating 0.45 ampere current. Only tubes that are magnetically deflected are included.

Face-Plate Code: C—clear, Cy—cylindrical, F—frosted, G—gray, Re—rectangular, Ro—round, S—spherical, T—treated, A—aluminized.

† Design-center values.

⋇ Internal magnetic unit to be used with external tubular magnetic shield.

§ For rectangular tubes, the horizontal deflection angle is given.

★Has heater current of 0.45 ampere.

Television Picture Tubes (continued)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLE§	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING ($\mu\mu f$)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS	GRID 2 VOLTS	TYPE
21CEP4	G, S, Re, A	Glass	106°	Electro.	8HR	14¾	16½ x 20⅜	2000–2500	None	18,000	500	16,000	0 to +400	400	**21CEP4**
21CGP4	G, S, Re, A	Glass	85°	Electro.	12L	20⅜	16½ x 20⅜	2000-2500	Single	20,000	200	14,000	−55 to +300	110	**21CGP4**
21CHP4	G, S, Re, A	Glass	85°	Electro.	12L	18⅜	16½ x 21½	2000-2500	None	20,000	200	14,000	−50 to +350	110	**21CHP4**
21CKP4★	G, S, Re, A	Glass	85°	Electro.	12L	18⅜	16½ x 20⅜	2000-2500	None	20,000	500	16,000	−50 to +350	300	**21CKP4★**
21CVP4	G, S, Re, A	Glass	85°	Electro.	12L	20⅜	16½ x 20⅜	2000-2500	None	20,000	550	16,000	−64 to +352	300	**21CVP4**
21CWP4	G, S, Re, A	Glass	85°	Electro.	12L	20⅜	16½ x 20⅜	2000-2500	Single	22,000	550	16,000	−64 to +352	300	**21CWP4**
21DP4	G, F, S, Re	Metal	66°	Electro.	12M	22⅝	$15\frac{7}{16}$ x $19\frac{27}{32}$	—	Single	18,000	500	14.000–18,000	2750 to 3740	300	**21DP4**
21EP4	G, Cy, Re	Glass	65°	Magnetic	12D	23⅜	15¾ x $20\frac{7}{16}$	No Coating	Single	18,000	500	16,000	—	300	**21EP4**
21EP4A	G, Cy, Re	Glass	65°	Magnetic	12N	23⅜	15¾ x $20\frac{7}{16}$	500–750	Single	18,000	500	16,000	—	300	**21EP4A**
21EP4B	G, Cy, Re, A	Glass	65°	Magnetic	12N	23⅜	15¾ x $20\frac{7}{16}$	500–750	Single	18,000	500	16,000	—	300	**21EP4B**

21FP4A	G, Cy, Re	Glass	65°	Electro.	12L	$23\frac{3}{8}$	$15\frac{3}{4}$ x $20\frac{7}{16}$	500–750	Single	18,000	500	14,000	−56 to +308	300	**21FP4A**
21FP4C	G, Cy, Re, A	Glass	65°	Electro.	12L	$23\frac{3}{8}$	$15\frac{3}{4}$ x $20\frac{7}{16}$	500–750	Single	18,000	500	14,000	−56 to +310	300	**21FP4C**
21JP4	G, Cy, Re	Glass	67°	Int. Magnetic⋇	12N	$23\frac{13}{32}$	$15\frac{3}{4}$ x $20\frac{7}{16}$	500–750	Internal	20,000	500	14,000	—	300	**21JP4**
21JP4A	G, Cy, Re, A	Glass	67°	Int. Magnetic⋇	12N	$23\frac{13}{32}$	$15\frac{3}{4}$ x $20\frac{7}{16}$	500–750	Internal	20,000	500	14,000	—	300	**21JP4A**
21KP4	G, Cy, Re	Glass	65°	Auto–Electro.	12D	$23\frac{1}{4}$	$15\frac{11}{16}$ x $21\frac{11}{32}$	No Coating	Single	18,000	410	14,000	—	300	**21KP4**
21KP4A	G, Cy, Re	Glass	65°	Auto–Electro.	12P	$23\frac{3}{8}$	$15\frac{11}{16}$ x $20\frac{3}{8}$	500–750	Single	18,000	500	12,000	—	300	**21KP4A**
21MP4	G, F, S, Re	Metal	66°	Electro.	12M	$22\frac{5}{8}$	$15\frac{7}{16}$ x $19\frac{27}{32}$	—	Single	16,000	500	14,000–16,000	−55 to +300	300	**21MP4**
21WP4	G, S, Re	Glass	66°	Magnetic	12N	$22\frac{5}{8}$	$15\frac{1}{16}$ x $18\frac{13}{16}$	500–750	Single	18,000	500	16,000	—	300	**21WP4**
21WP4A	G, S, Re, A	Glass	66°	Magnetic	12N	$22\frac{13}{16}$	$15\frac{1}{16}$ x $18\frac{13}{16}$	500–750	Single	18,000	500	16,000	—	300	**21WP4A**
21XP4	G, S, Re	Glass	66°	Electro.	12L	$22\frac{13}{16}$	$15\frac{1}{16}$ x $18\frac{13}{16}$	2000–2500	Single	18,000	500	16,000	−64 to +352	300	**21XP4**
21XP4A	G, S, Re, A	Glass	66°	Electro.	12L	$22\frac{13}{16}$	$15\frac{1}{16}$ x $18\frac{13}{16}$	2000–2500	Single	18,000	500	16,000	−64 to +352	300	**21XP4A**
21YP4	G, S, Re	Glass	65°	Electro.	12L	$23\frac{3}{8}$	$15\frac{3}{4}$ x $20\frac{7}{16}$	500–750	Single	18,000	500	14,000 18,000	−55 to +300 −72 to +396	300 300	**21YP4**
21YP4A	G, S, Re, A	Glass	65°	Electro.	12L	$23\frac{3}{8}$	$15\frac{11}{16}$ x $20\frac{3}{8}$	500–750	Single	18,000	500	16,000	−64 to +350	300	**21YP4A**

NOTES: All tubes in this section have heater ratings of 6.3 volts and 0.6 ampere unless marked ★, indicating 0.45 ampere current. Only tubes that are magnetically deflected are included.

Face-Plate Code: C—clear, Cy—cylindrical, F—frosted, G—gray, Re—rectangular, Ro—round, S—spherical, T—treated, A—aluminized.

† Design-center values.
⋇ Internal magnetic unit to be used with external tubular magnetic shield.
§ For rectangular tubes, the horizontal deflection angle is given.
★Has heater current of 0.45 ampere.

Television Picture Tubes (continued)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLES§	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING (μμf)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS	GRID 2 VOLTS	TYPE
21ZP4	G, S, Re	Glass	65°	Magnetic	12D	$23\frac{9}{32}$	$15\frac{3}{4}$ x $20\frac{7}{16}$	No Coating	Single	18,000	500	12,000	—	300	**21ZP4**
21ZP4A	G, S, Re	Glass	65°	Magnetic	12N	$23\frac{3}{8}$	$15\frac{11}{16}$ x $20\frac{3}{8}$	500–750	Single	18,000	500	16,000	—	300	**21ZP4A**
21ZP4B	G, S, Re, A	Glass	67°	Magnetic	12N	$23\frac{13}{32}$	$15\frac{11}{16}$ x $20\frac{3}{8}$	500–750	Single	18,000	500	16,000	—	300	**21ZP4B**
22AP4	C, S, Ro	Metal	70°	Magnetic	12D	$23\frac{3}{8}$	$21\frac{13}{16}$	—	Single	19,000	410	14,000	—	300	**22AP4**
22AP4A	G, S, Ro	Metal	70°	Magnetic	12D	$23\frac{3}{8}$	$21\frac{13}{16}$	—	Single	19,000	410	14,000	—	300	**22AP4A**
24AP4	G, S, Ro	Metal	70°	Magnetic	12D	$24\frac{7}{16}$	$24\frac{1}{4}$	—	Single	16,000	410	15,000	—	300	**24AP4**
24AP4A	G, S, Ro, A	Metal	70°	Magnetic	12D	$24\frac{7}{16}$	$24\frac{1}{4}$	—	Single	16,000	410	15,000	—	300	**24AP4A**
24AP4B	G, T, S, Ro	Metal	70°	Magnetic	12D	$24\frac{7}{16}$	$24\frac{1}{4}$	—	Single	16,000	410	15,000	—	300	**24AP4B**
24ADP4	G, S, Re, A	Glass	85°	Magnetic	12N	$21\frac{1}{8}$	$18\frac{7}{16}$ x $22\frac{11}{16}$	2000-2500	Single	22,000	600	18,000	—	300	**24ADP4**
24AHP4	G, S, Re, A	Glass	105°	Electro.	8HR	$15\frac{13}{16}$	$18\frac{9}{16}$ x $22\frac{13}{16}$	2000-2500	None	20,000	500	16,000	−50 to +350	300	**24AHP4**

24BP4	G, S, Ro	Metal	70°	Electro.	12M	24¾	24⅛	—	Single	16,000	500	14,000	−56 to +310	300	**24BP4**
24CP4	G, S, Re	Glass	85°	Magnetic	12N	21½	$18\frac{9}{16}$ x $22\frac{11}{16}$	2000–2500	Single	20,000	500	18,000	—	300	**24CP4**
24CP4A	G, S, Re, A	Glass	85°	Magnetic	12N	21½	$18\frac{9}{16}$ x $22\frac{13}{16}$	2000–2500	Single	20,000	500	16,000	—	300	**24CP4A**
24DP4	G, S, Re	Glass	85°	Electro.	12L	21½	$18\frac{9}{16}$ x $22\frac{11}{16}$	2000–2500	Single	20,000	500	18,000	−72 to +400	300	**24DP4**
24DP4A	G, S, Re, A	Glass	85°	Electro.	12L	21½	$18\frac{9}{16}$ x $22\frac{13}{16}$	2000–2500	Single	20,000	500	16,000	−64 to +350	300	**24DP4A**
24QP4	G, S, Re	Glass	85°	Magnetic	12N	21½	$18\frac{9}{16}$ x $22\frac{13}{16}$	500–750	Single	18,000	500	16,000	—	300	**24QP4**
24TP4	G, S, Re, A	Glass	85°	Magnetic	12N	21½	$18\frac{7}{16}$ x $22\frac{11}{16}$	250–750	Single	20,000	500	14,000	—	300	**24TP4**
24VP4	G, S, Re	Glass	87°	Magnetic	12N	21½	$18\frac{9}{16}$ x $22\frac{51}{64}$	2000–2500	Single	22,000	600	20,000	—	300	**24VP4**
24VP4A	G, S, Re, A	Glass	87°	Magnetic	12N	21½	$18\frac{9}{16}$ x $22\frac{51}{64}$	2000–2500	Single	22,000	600	20,000	—	300	**24VP4A**
24XP4	G, S, Re	Glass	85°	Magnetic	12D	21½	18⅝ x 22⅞	No Coating	Single	20,000	500	18,000	—	300	**24XP4**
24YP4	G, S, Re, A	Glass	85°	Electro.	12L	21½	$18\frac{9}{16}$ x $22\frac{13}{16}$	2000–2500	Single	20,000	500	16,000	−64 to +350	300	**24YP4**
24ZP4	G, S, Re, A	Glass	85°	Electro.	12L	21½	$18\frac{9}{16}$ x $22\frac{51}{64}$	2000–2500	None	20,000	500	16,000	0 to 500	300	**24ZP4**
27AP4	G, T, S, Re	Metal	85°	Electro.	12M	$22\frac{3}{16}$	$20\frac{1}{16}$ x 25⅜	—	Single	18,000	500	15,000	−60 to +300	300	**27AP4**
27EP4	G, S, Re, A	Glass	85°	Magnetic	12D	$23\frac{7}{16}$	$20\frac{13}{32}$ x $25\frac{15}{32}$	No Coating	Single	20,000	500	16,000	—	300	**27EP4**

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† Design-center values.
⋇ Internal magnetic unit to be used with external tubular magnetic shield.
§ For rectangular tubes, the horizontal deflection angle is given.
★ Has heater current of 0.45 ampere.

Television Picture Tubes (continued)

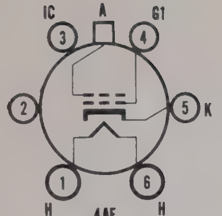
	GENERAL DESCRIPTION											RATINGS†	TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLE§	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING (μμf)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS	GRID 2 VOLTS	TYPE
27GP4	G, S, Re	Glass	85°	Magnetic	12D	23 7/16	20 7/32 x 25 9/32	No Coating	Single	22,500	500	16,000	—	300	**27GP4**
27LP4	G, S, Re, A	Glass	85°	Magnetic	12N	24 47/64	20 15/32 x 25 17/32	250–400	Single	22,000	600	20,000	—	300	**27LP4**
27MP4	G, F, S, Re	Metal	85°	Magnetic	12D	22 3/16	20 1/8 x 25 7/16	—	Single	18,000	500	16,000–18,0000	—	300	**27MP4**
27NP4	G, S, Re	Glass	85°	Magnetic	12N	23 3/8	20 11/32 x 25 13/32	500–750	Single	18,000	500	16,000	—	300	**27NP4**
27RP4	G, S, Re, A	Glass	85°	Magnetic	12N	23 7/16	20 13/32 x 25 15/32	500–750	Single	20,000	500	16,000	—	300	**27RP4**
27SP4	G, S, Re, A	Glass	85°	Electro.	12L	23 7/16	20 13/32 x 25 15/32	500–750	Single	20,000	500	18,000	−72 to +396	300	**27SP4**
27UP4	G, S, Re	Glass	85°	Electro.	12L	23 7/16	20 13/32 x 25 15/32	500–750	Single	20,000	500	16,000	0 to 396	300	**27UP4**
30BP4	G, S, Ro	Metal	90°	Magnetic	12D	24 1/16	30 3/8	—	Single	30,000	410	22,000	—	300	**30BP4**

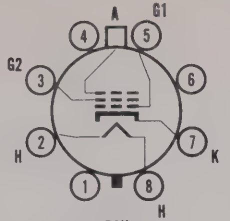
NOTES: All tubes in this section have heater ratings of 6.3 volts and 0.6 ampere unless marked ★, indicating 0.45 ampere current. Only tubes that are magnetically deflected are included.

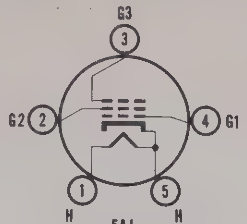
Face-Plate Code: C—clear, Cy—cylindrical, F—frosted, G—gray, Re—rectangular, Ro—round, S—spherical, T—treated, A—aluminized.

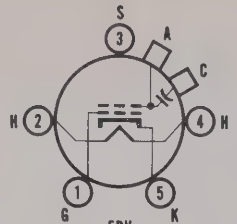
† Design-center values.
⋇ Internal magnetic unit to be used with external tubular magnetic shield.
§ For rectangular tubes, the horizontal deflection angle is given.
★Has heater current of 0.45 ampere.

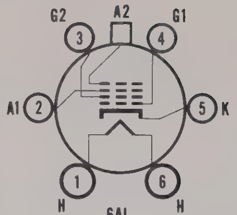
BASING DIAGRAMS FOR PICTURE TUBE REFERENCE GUIDE

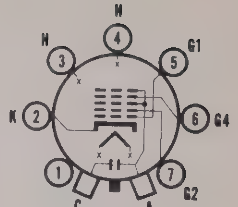

IC
A
G1
3
4
2
5
K
1
6
H
H
4AF

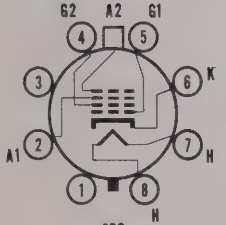

A
G1
4
5
G2
3
6
2
H
7
K
1
8
H
5AN

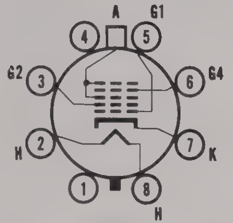

G3
3
G2
2
4
G1
1
5
H
H
5AJ

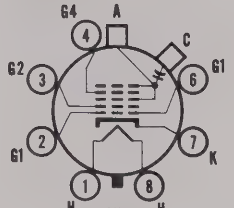

S
3
A
C
H
2
4
H
1
5
G
K
5BV

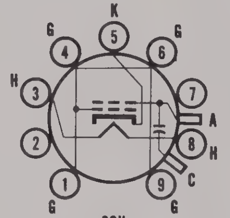

G2
A2
G1
3
4
A1
2
5
K
1
6
H
H
6AL

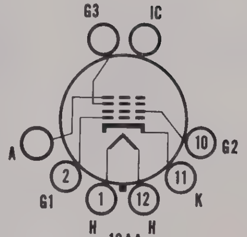

H
4
H
3
G1
5
K
2
6
G4
1
7
C
A
G2
7FA

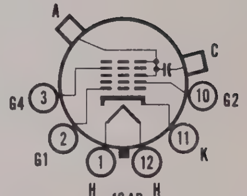

G2
A2
G1
4
5
3
6
K
A1
2
7
H
1
8
H
8BQ

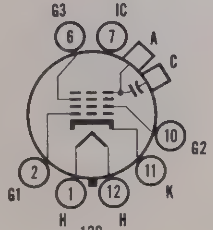

A
G1
4
5
G2
3
6
G4
H
2
7
K
1
8
H
8EQ


G4
A
4
C
G1
G2
3
6
G1
2
7
K
1
8
H
H
8HR


K
G
5
G
4
6
H
3
7
A
2
8
H
1
9
C
G
G
9CH


G3
IC
A
10
G2
2
11
G1
1
12
K
H
H
12AA


A
C
G4
3
10
G2
2
11
G1
1
12
K
H
H
12AB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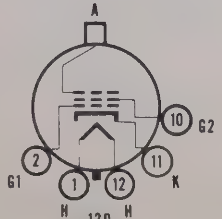
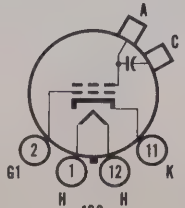
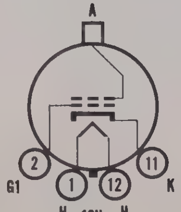
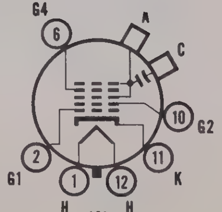
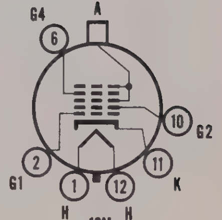
6
7
A
C
10
G2
2
11
G1
1
12
K
H
H
12C


A
10
G2
2
11
G1
1
12
K
H
H
12D

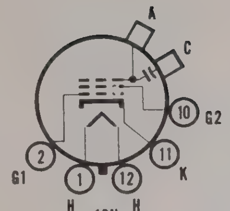

A
C
2
11
G1
1
12
K
H
H
12G


A
2
11
G1
1
12
K
H
H
12H

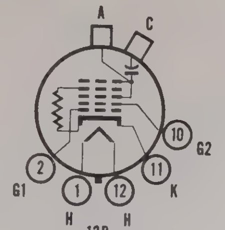

G4
6
A
C
10
G2
2
11
G1
1
12
K
H
H
12L


G4
A
6
10
G2
2
11
G1
1
12
K
H
H
12M

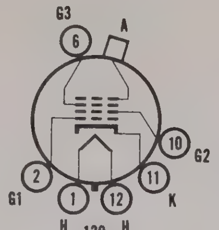
BASING DIAGRAMS FOR PICTURE TUBE REFERENCE GUIDE


A
C
10
G2
11
K
12
H
1
H
2
G1

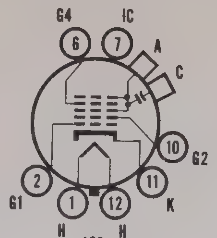
12N


A
C
10
G2
11
K
12
H
1
H
2
G1

12P


G3
6
A
10
G2
11
K
12
H
1
H
2
G1

12Q


G4
6
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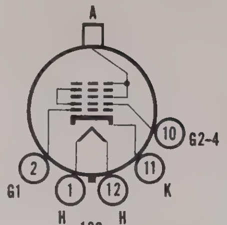
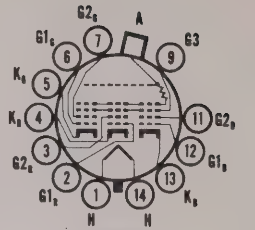
7
A
C
10
G2
11
K
12
H
1
H
2
G1

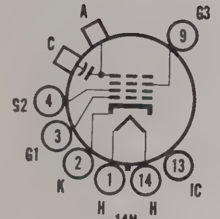
12R


A
10
G2-4
11
K
12
H
1
H
2
G1

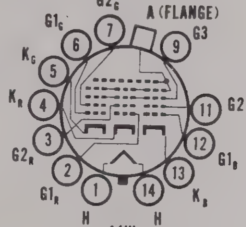
12S


$G2_G$
7
A
9
G3
$G1_G$
6
K_G
5
K_R
4
11
$G2_B$
3
$G2_R$
12
$G1_B$
2
$G1_R$
1
H
14
H
13
K_B

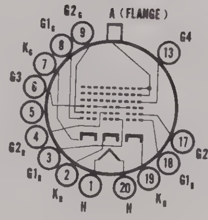
14AH


A
C
9
G3
S2
4
3
G1
2
K
1
H
14
H
13
IC

14N


$G2_G$
7
A (FLANGE)
9
G3
$G1_G$
6
K_G
5
K_R
4
11
$G2_B$
3
$G2_R$
12
$G1_B$
2
$G1_R$
1
H
14
H
13
K_B

14W


$G1_G$
8
$G2_G$
9
A (FLANGE)
G4
13
K_G
7
G3
6
5
4
$G2_R$
3
$G1_R$
2
K_R
1
H
20
H
19
K_B
18
$G1_B$
17
$G2_B$

15 GP 22
15 HP 22
19 TP 22

CBS

SEMICONDUCTORS

TRANSISTOR AND CRYSTAL DIODES

Contains all popular diodes for
television and industry:
germanium diodes, silicon diodes,
and silicon power rectifiers.

CBS SEMICONDUCTORS

CBS

GERMANIUM AND SILICON DIODES

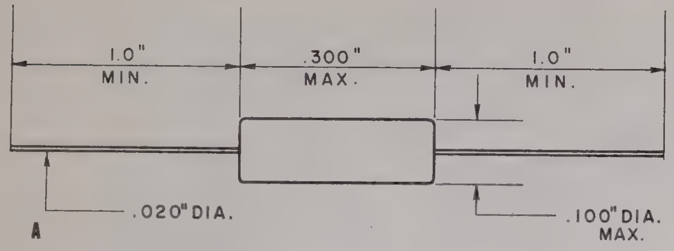
Type	Outline Drawing	MAXIMUM RATINGS, 25°C ambient					ELECTRICAL CHARACTERISTICS, 25°C ambient					Description
		Peak Reverse Voltage	Operating Reverse Voltage	Forward Current, ma			Minimum Forward Current at +1V ma	Maximum Reverse Current				
				Average	Recurrent Peak	Surge 1 sec.		Volts	μa	Volts	μa	
1N34	A & B	75	60	40	150	500	5.0	−10	50	−50	500	General Purpose
1N34A	A & B	75	60	50	150	500	5.0	−10	30	−50	500	General Purpose
1N35°	*	75	60	50	150	500	7.5△	−10	10			Matched Pair
1N38/1N38A	A & B	120	100	50	150	500	4.0	−3	6	−100	500	High Reverse Voltage, JAN
1N39/1N39A	B	225	200	50	150	200	5.0	−100	200	−200	800	High Reverse Voltage
1N40°	D	75	60	40	150	500	12.75 at 1.5V△	−10	100	−50	850	Quad Demodulator
1N42°	D	125	100	50	150	500	12.75 at 1.5V△	−3	6	−100	625	Quad Demodulator
1N48	A & B	85	70	50	150	400	4.0	−50	833			General Purpose Detector
1N51	B	50	40	25	100	300	2.5	−50	1660			General Purpose
1N52	A & B	85	70	50	150	400	4.0	−50	150			General Purpose
1N54	A & B	50	35	40	150	500	5.0	−10	10			General Purpose
1N54A	A & B	75	50	50	150	500	5.0	−10	7	−50	60	General Purpose
1N55/1N55A	A & B	170	150	50	150	500	4.0	−100	300	−150	500	Gen. Purpose, High Reverse Voltage
1N55B	A & B	190	150	50	150	500	5.0	−150	500			Gen. Purpose, High Reverse Voltage
1N56/1N56A	A & B	50	40	60	200	1000	15.0	−30	300			High Conduction
1N58/1N58A	A & B	120	100	50	150	500	5.0	−100	600			High Reverse Voltage
1N60	A	30	25	50	150	500	3.0			−10	67	Video Detector
1N63	A & B	125	100	50	150	400	4.0	−50	50			General Purpose
1N64	A & B	20	15							−10	200	Video Detector
1N65	A & B	85	70	50	150	400	2.5	−50	200			General Purpose
1N67/1N67A	A & B	100	80	35	100	500	4.0	−5	5	−50	50	Gen. Purpose, High Reverse Resistance
1N68A	A	130	100	35	100	500	3.0	−100	625			Gen. Purpose, High Reverse Voltage
1N69	B	75	60	40	125	400	5.0	−10	30	−50	500	General Purpose, JAN
1N70	B	125	100	30	90	350	3.0	−10	25	−50	300	General Purpose, JAN
1N71°	D	50	40	60	200	1000	15.0△	−30	300			Quad. High Conductance Bridge Ckt

1N74	D	75	60	22.5	60	100	15 at 1.2 to 1.6V△	−10	50			Quad, Bridge Circuit
1N75	A & B	125	100	50	150	400	2.5	−50	50			General Purpose
1N81	B	50	40	30	90	350	3.0	−10	10			General Purpose, JAN
1N82†	B & C		5		Designed for efficient low-noise mixer operation from 470 to 890 mc							Silicon — UHF Mixer
1N82A†	B & C		5		Designed for efficient low-noise mixer operation from 470 to 890 mc							Silicon — UHF Mixer
1N90	A	75	60	40	150	500	5.0	−50	800			General Purpose
1N111#	A	70	60	50	150	500	5.0	−10	25	−50	125	Computer
1N112#	A	70	60	50	150	500	5.0	−10	50	−50	250	Computer
1N113#	A	70	60	50	150	500	2.5	−10	25	−50	125	Computer
1N114#	A	70	60	50	150	500	2.5	−10	50	−50	250	Computer
1N115#	A	70	60	50	150	500	2.5	−10	100	−50	500	Computer
1N116	A	75	60	30	—	—	5.0	—	—	−50	100	High Resistance, Gen. Purpose
1N126	A	75	60	30	90	350	5.0	−10	50	−50	300	General Purpose, JAN
1N127	A	125	100	30	90	300	3.0	−10	25	−50	200	General Purpose
1N128	A	50	40	30	90	300	3.0	−10	10			General Purpose, JAN
1N191#	A	105	70	50	150	500	5.0	−10	25	−10	125	Computer, Fast Recovery Time
1N192#	A	55	80	50	150	500	5.0	−10	50	−10	250	Computer, Fast Recovery Time
1N198 at 25°C	A	100	80	30	90	300	4.0	−10	10	−50	40	High Temp., High Reverse Resistance
at 75°C		100	60	30	90	300	5.0	−10	75	−50	250	High Temp., High Reverse Resistance
1N497	A	25	20	80	250		100	−20	20			Bonded Junction
1N498	A	50	40	80	250		100	−40	25			Bonded Junction
1N499	A	65	50	80	250		100	−50	30			Bonded Junction
1N500	A	75	60	80	250		100	−60	40			Bonded Junction
1N501	A	100	80	80	250		100	−80	40			Bonded Junction
1N502	A	125	100	80	250		100	−100	40			Bonded Junction
1N636	A	60	45	75 mw Dissipation			2.5	−10	10	Shunt Cap. 0.5 $\mu\mu f$		High Resistance, Gen. Purpose

*Special package
†Units are tested for noise figure in instruments designed to correlate with customer applications.
°Characteristics are for each diode.
#Reverse characteristics measured at 55°C.

△Matching
1N35 — Current at +1.0V matched within 10%
1N40, 1N42 — Resistance of diodes in each pair matched within 3Ω at +1.5V.
1N71 — Current of all four diodes matched within 1ma at +1.0V.
1N73 — Resistance of diodes in each pair matched within 2Ω at +15.0 ma d-c.
1N74 — Resistance of diodes in each pair matched within 6.7Ω at +15.0 ma d-c.

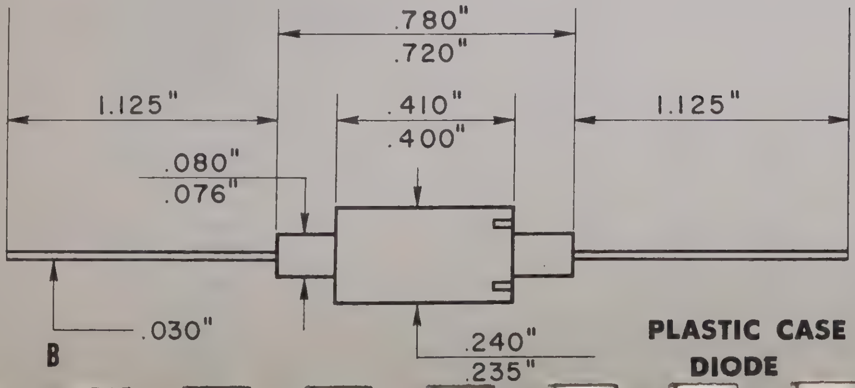
PHYSICAL TYPES AVAILABLE FOR GERMANIUM AND SILICON DIODES


1.0"
MIN.
.300"
MAX.
1.0"
MIN.
.020" DIA.
.100" DIA.
MAX.

A

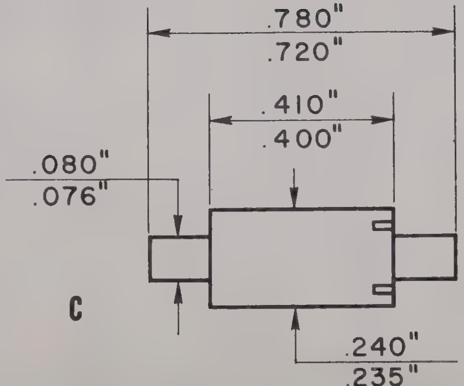
GLASS-ENCASED DIODE *

*RETMA standard color coded for identification. Three bands reading from cathode end indicate the numbers after the prefix "1N"; e.g., 1N**497.** (UHF silicon diodes excepted; the cathode is the crystal, the anode is the whisker.) A fourth band is the manufacturing date code.


.780"
.720"
1.125"
.410"
.400"
1.125"
.080"
.076"
.030"
.240"
.235"

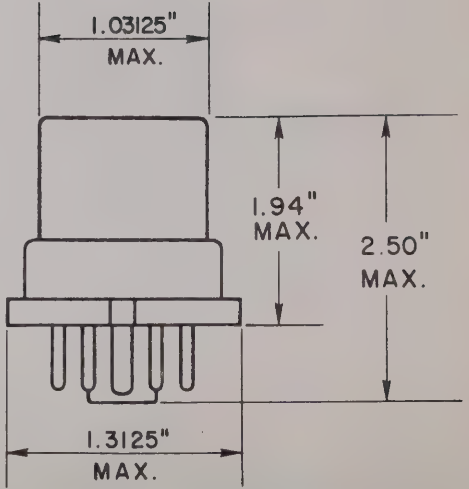
B

PLASTIC CASE DIODE


.780"
.720"
.410"
.400"
.080"
.076"
.240"
.235"

C

GLASS-FILLED PLASTIC CASE DIODE . . . CLIP-IN TYPE

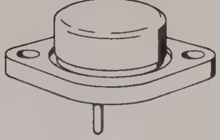

1.03125"
MAX.
1.94"
MAX.
2.50"
MAX.
1.3125"
MAX.

D

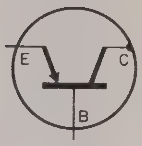
QUAD WITH STANDARD OCTAL BASE WILL BE SUPPLIED FOR ANY CBS DIODE

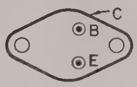
CBS

2N155



**PNP power transistor . . .
metal case with plug-in leads for
automobile receivers . . . used for
audio power output stages,
servo amplifiers, d-c converter,
and magnetic coil driver**





ELECTRICAL DATA

RATINGS, ABSOLUTE MAXIMUM, AT 25°C

Collector to base voltage, V_{CB}	−30	volts
Emitter to base voltage, V_{EB}	−15	volts
Collector current, continuous, I_C	−3	amp
Dissipation total▼, P	8.5	watts
Operating temperature, T_j	−40 to +85	°C
Storage temperature, T_{stg}	−40 to +85	°C

DESIGN CHARACTERISTICS

	LIMITS Min.	Distribution Center	Max.	
Collector cutoff current; I_{CBO} at $V_{CB} = -30V$, $I_E = 0$				
Case temperature 25°C		0.18	1.0	mAdc
Case temperature 50°C			2.0	mAdc
Case temperature 85°C			10	mAdc
Collector cutoff current; I_{CBS} at $V_{CB} = -30V$				
Case temperature 25°C			0.42	mAdc
Emitter cutoff current; I_{EBO} at $V_{EB} = -15V$, $I_C = 0$				
Case temperature 25°C		0.6	0.5	mAdc
Case temperature 50°C			1.0	mAdc
Case temperature 85°C			5.0	mAdc
Power gain†, PG at 25°C	30			db
Current gain, B at 25°C				
$I_C = 0.25A$		45		
$I_C = 0.50A$	24	40		
$I_C = 1.00A$		32		
Saturation voltage; V_S at $I_C = 1.0A$, 25°C		0.47	0.65	Vdc
Input voltage, V_{BE} at 25°C				
$I_C = 0.25A$		0.34		Vdc
$I_C = 0.50A$		0.47	0.70	Vdc
$I_C = 1.00A$		0.60		Vdc
Thermal resistance, θ at 25°C			3	°C/w
Derating per °C temp. increase▲	0.14			watts
Alpha cutoff frequency; $F_{\alpha b}$ at $V_C = 2V$, $I_C = 0.25A$	145	180		kc

TYPICAL OPERATIONS AT 25°C (one unit, common emitter)

Class A Amplifier

Collector supply voltage, V_{CC}	−14	Vdc
Collector current, I_C	−360	mAdc
Base current, I_B	−8	mAdc
Base to emitter voltage, V_{BE}	−0.32	Vdc
Dissipation, zero signal, P	4.4	watts
Input resistance, R_{in}	20	ohms
Load resistance, R_L	30	ohms
Power output, P_{out}	2	watts
Power input, P_{in}	1	mw
Power gain, PG	33	db
Distortion, D	5	%

2N155 (cont.)

PUSH-PULL CLASS B AMPLIFIER

Collector supply voltage, V_{CC}	−14	Vdc
Collector current, zero signal, I_C	−50	mAdc
Collector current, max. signal, I_C	−500	mAdc
Peak collector current, i_c	−1.5	Adc
Base current, zero signal, I_B	−1	mAdc
Base current, max. signal I_B	−13	mAdc
Dissipation, zero signal, P	0.7	watt
Dissipation, max. signal, P	1.6	watts
Input resistance, R_{in}	40	ohms
Load resistance (collector to collector), R_L	32	ohms
Power output‡, P_{out}	9	watts
Power input‡, P_{in}	30	mw
Power gain‡, PG	25	db
Distortion, D	8	%

SWITCHING APPLICATION ★

Collector supply voltage, V_{CC}	−14	Vdc
Collector load resistance, R_L	6.5	ohms
Collector current "OFF," I_c	−0.2	mAdc
Collector current "ON," I_c	−2	Adc
Base voltage "OFF," V_b	+1.5	Vdc
Base voltage "ON," V_b	−1.0	Vdc
Base current "ON," I_b	−100	mAdc
Dissipation "ON," P	2	watts
Switch power, PS	26	watts
Control power, PC	100	mw
Power gain, PG	25	db

NOTES:

■IRE symbols used throughout. See APPENDIX for symbol definition.

▼Bolted directly to a 6″ x 6″ x ⅛″ aluminum sheet (75 sq. in. radiating surface)
  a. 7.25 watts max. with a 0.0015″ mica washer treated with DC200 silicone oil between the transistor and the heat sink (75 sq. in. radiating surface)
  b. 1.5 watts max. in free air.

▲Under mounting conditions listed in previous note.
  a. 0.12 watt under conditions of note ▼a.
  b. 0.024 watt under conditions of note ▼b.

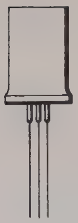
$$\dagger PG = \frac{\text{Power output}}{\text{available input power (from a 12 ohm generator)}} \quad \text{where } IC = 0.5\,\text{Adc},\ R_L = 30\text{ ohms}$$

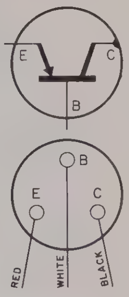
‡Both units.

★Use of an efficient heat radiator for operation at these conditions is imperative.

CBS

2N156
2N158





**PNP power transistor . . .
metal case for bolt type mounting
. . . used for low speed switching,
servo motor controls, and audio
or sawtooth oscillators**

ELECTRICAL DATA■

RATINGS, ABSOLUTE MAXIMUM, AT 25°C

	2N156		2N158*	
Collector to base voltage, V_{CB}	−30		−60	volts
Emitter to base voltage, V_{EB}	−15		−30	volts
Collector current, continuous, I_C	−3		−3	amp
Dissipation total▼, P	8.5		8.5	watts
Operating temperature, T		−40 to +85		°C
Storage temperature, T_{stg}		−40 to +85		°C

DESIGN CHARACTERISTICS

	Type	Case Temp. °C	LIMITS Min.	Distribution Center	Max.
Collector cutoff current, I_{CBO}					
V_{CB} = −30V, I_E = OV	2N156	25		0.18	1.0 mAdc
		50			2.0 mAdc
		85			10 mAdc
V_{CB} = −60V, I_E = OV	2N158	25		0.14	1.0 mAdc
		50			2.0 mAdc
		85			10 mAdc
Collector cutoff, current, I_{CBS}					
V_{CB} = −30V, V_{EB} = OV	2N156	25		0.26	1.5 mAdc
		50			5.0 mAdc
V_{CB} = −60V, V_{EB} = OV	2N158	25		0.26	1.5 mAdc
		50			5.0 mAdc
Collector cutoff current, I_{CB}					
V_{CB} = −30V, V_{EB} = −0.5V	2N156	85			10 mAdc
V_{CB} = −60V, V_{EB} = −0.5V	2N158	85			10 mAdc
Emitter cutoff current, I_{EBO}					
V_{EB} = −15V, I_C = 0	2N156	25		0.06	0.5 mAdc
		50			1.0 mAdc
		85			5.0 mAdc
V_{EB} = −30V, I_C = 0	2N158	25		0.08	0.5 mAdc
		50			1.0 mAdc
		85			5.0 mAdc
Current gain, B					
I_C = 0.25A	2N156	25		45	
I_C = 0.50A		25	24	40	
I_C = 1.00A		25		32	
I_C = 0.25A	2N158	25		41	
I_C = 0.50A		25	21	36	
I_C = 1.00A		25		29	

2N156-2N158 (cont.)

DESIGN CHARACTERISTICS (cont.)

Saturation voltage, V_S						
$I_C = 1.0A$........	2N156	25		0.37	0.60	Vdc
$I_C = 1.0A$........	2N158	25		0.46	0.75	Vdc
Input voltage, V_{BE}						
$I_C = 0.25A$......	2N156	25		0.29		Vdc
$I_C = 0.25A$......	2N158	25		0.33		Vdc
$I_C = 0.50A$......	2N156	25		0.36	0.70	Vdc
$I_C = 0.50A$......	2N158	25		0.42	0.85	Vdc
$I_C = 1.0A$........	2N156	25		0.44		Vdc
$I_C = 1.0A$........	2N158	25		0.53		Vdc
Thermal resistance, θ	Both	25			3	°C/w
Derating▲						
Per °C ambient temp. increase...	Both		0.14			watts
Alpha cutoff frequency, $F_{\alpha b}$						
$V_C = 2V$, $I_C = 0.25A$.......	Both	24	145	180		Kc

TYPICAL OPERATIONS AT 25°C (one unit, common emitter)

Class A Amplifier	**2N156**	**2N158**	
Collector supply voltage, V_{CC}................	−14	−28	Vdc
Collector current, I_C.......................	−360	−180	mAdc
Base current, I_B.............................	−8	−3.8	mAdc
Base to emitter voltage, V_{BE}..............	−0.32	−0.27	Vdc
Dissipation, zero signal, P....................	4.4	4.4	watts
Input resistance, R_{in}........................	20	27	ohms
Load resistance, R_L..........................	30	150	ohms
Power output, P_{out}............................	2	2	watts
Power input, P_{in}..............................	1	0.4	mw
Power gain, PG................................	33	37	db
Distortion, D.....................................	5	6	%

Push-Pull Class B Amplifier			
Collector supply voltage, V_{CC}................	−14	−28	Vdc
Collector current, zero signal, I_C............	−50	−25	mAdc
Collector current, max. signal I_C...........	−500	−500	mAdc
Peak collector current, i_c..................	−1.5	−1.5	Adc
Base current, zero signal, I_B................	−1	−0.5	mAdc
Base current, max. signal, I_B...............	−13	−14	mAdc
Dissipation, zero signal, P.....................	0.7	0.7	watt
Dissipation, max. signal, P....................	1.6	3.2	watts
Input resistance, R_{in}..........................	40	40	ohms
Load resistance (collector to collector), R_L....	32	60	ohms
Power output‡, P_{out}............................	9	17	watts
Power input‡, P_{in}..............................	30	60	mw
Power gain‡, PG................................	25	24	db
Distortion, D.......................................	8	8	%

SWITCHING APPLICATION★	**2N156**	**2N158**	
Collector supply voltage, V_{CC}................	−14	−28	Vdc
Collector load resistance, R_L..................	6.5	13	ohms
Collector current "OFF," I_C..................	−0.2	−0.3	mAdc
Collector current "ON," I_C....................	−2	−2	Adc
Base voltage "OFF," V_b.......................	+1.5	+1.5	Vdc
Base voltage "ON," V_b.........................	−1.0	−1.7	Vdc
Base current, "ON," I_b......................	−100	−150	mAdc
Dissipation "ON," P............................	2	2.5	watts
Switching power, PS............................	26	54	watts
Control power, PC..............................	100	250	mw
Power gain, PG.................................	25	23	db

NOTES:

*Units with higher collector-base voltage ratings are available upon request.

■IRE symbols used throughout. See APPENDIX for symbol definition.

▼Bolted directly to a 6″ x 6″ x ⅛″ aluminum sheet. (75 sq. in. radiating surface)
  a. 7.25 watts max with a 0.0015″ mica washer treated with DC200 silicone oil between the transistor and the heat sink (75 sq. in. radiating surface).
  b. 1.5 watts max. in free air.

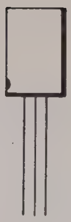
▲Under mounting conditions listed in previous note:
  a. 0.12 watt under condition for note ▼a.
  b. 0.024 watt under conditions for note ▼b.

‡Both units.

★Use of an efficient heat radiator for operation in these conditions is imperative.

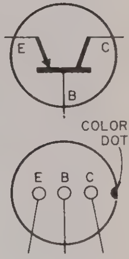
CBS

2N180
2N181

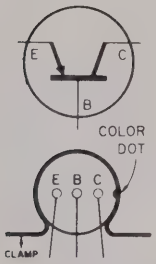


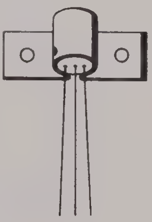
PNP general purpose transistor . . . high gain . . . low-to-medium power . . . low noise . . . for Class A and B stages, preamplifiers, and low-frequency flip-flop circuits

2N180



2N181





ELECTRICAL DATA

RATINGS, ABSOLUTE MAXIMUM, AT 25°C

	2N180	2N181	
Collector to base voltage, d-c	−30	−30	volts
Dissipation, total in free air	150	250	mw
Derating per °C ambient temp. increase	3	5	mw
Operating temperature, junction	−50 to +75		°C
Storage temperature	−50 to +85		°C

TYPICAL CHARACTERISTICS AT 25°C

	2N180	2N181	
Collector peak reverse voltage, emitter open	−40	−40	volts
Collector current, emitter open at −30V	−10	−10	μa
Collector current, base open at −10V	−0.3	−0.3	ma
Emitter peak reverse voltage, collector open	−30	−30	volts
Emitter reverse current, collector open at −20V	−8	−8	μa

Low Frequency Small Signal Parameters

	2N180	2N181	
Collector voltage, V_{CB}	−6	−6	volts
Emitter current, I_E	1.0	1.0	ma
Frequency	270	270	c.p.s.
Base-collector current amplification, β	60	60	
Emitter-collector current amplification, α or h_{fb}	0.985	0.985	
Alpha cut-off frequency, $F_{\alpha co}$	700	700	kc
Emitter input resistance, output shorted, h_{ib}	32	32	ohms
Collector output conductance, input open, h_{ob}	0.5	0.5	μmhos
Collector-emitter feedback voltage ratio, h_{rb}	$4x10^4$	$4x10^4$	
Collector capacitance, at 500 kc	25	25	μμf
Noise figure	12	12	db

Large Signal Low Frequency Parameters

	2N180	2N181	
Base-collector current amplification, $B = I_C/I_B$			
$I_B = 0.1$ ma, $V_C = -1V$	70	70	
$I_B = 1.0$ ma, $V_C = -1V$	50	50	
Base input resistance, $R_i = V_b/I_b$			
$I_B = 0.1$ ma, $V_C = -1V$	2000	2000	ohms
$I_B = 1.0$ ma, $V_C = -1V$	500	500	ohms
Saturation resistance, R_S	2.5	2.5	ohms

2N180-2N181 (cont.)

TYPICAL OPERATIONS AT 25°C

Class A Low Level Audio Amplifier (common emitter connected)

	2N180	2N181	
Collector supply voltage	−6	−6	volts
Collector current, d-c	−1	−1	ma
Current amplification	60	60	
Load resistance, dynamic	20	20	K
Input resistance, dynamic	1500	1500	ohms
Power gain	43	43	db
Collector supply voltage	−9	−12	volts
Collector current, d-c	−15	−20	ma
Base current, d-c	−250	−300	μa
Dissipation, max.	135	250	mw
Current amplification	50	50	
Stabilizing resistance in emitter circuit, bypassed with 200 μf capacitor	10	10	ohms
Base-emitter circuit d-c resistance, max.	1000	500	ohms
Input resistance, dynamic	250	250	ohms
Load resistance, dynamic	560	110	ohms
Power output, max.	65	110	mw
Power gain	37	34	db

Push-Pull Class B Amplifier (common emitter connected)†

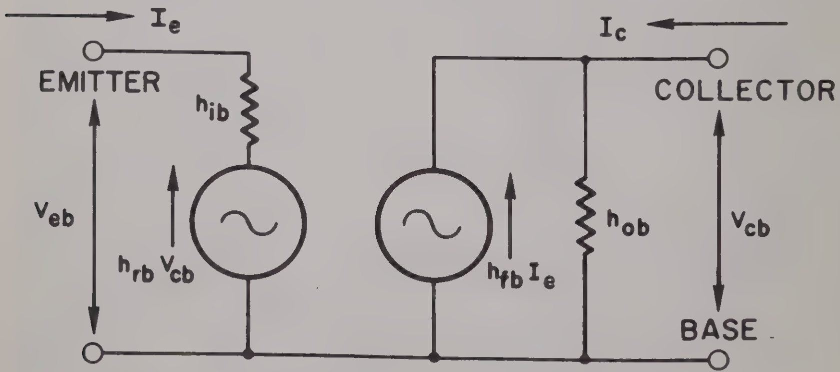
	2N180	2N181	
Collector supply voltage	−9	−12	volts
Collector current, max. signal	−25	−38	ma
Collector current, zero signal	−5	−7	ma
Peak collector current, max. signal	−75	−110	ma
Base current, max. signal	−500	−800	μa
Base current, zero signal	−60	−80	μa
Dissipation per unit, max. signal	100	200	mw
Dissipation per unit, zero signal	40	80	mw
Stabilizing resistance in emitter circuit, not bypassed	10	10	ohms
Base-emitter circuit d-c resistance, max.	1000	500	ohms
Input resistance, dynamic	800	700	ohms
Load resistance, dynamic	110	100	ohms
Power output, total max.‡	300	600	mw
Power input, total max.‡	1.0	2.0	mw
Power gain	25	25	db

NOTES:

‡Values for both units.

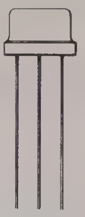
†Information on matched pair specification available on request.

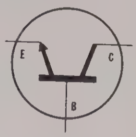
LOW FREQUENCY HYBRID PARAMETERS



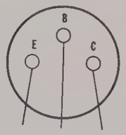
CBS

2N438
2N439
2N440





NPN high frequency transistors . . . low base resistance providing fast response . . . for switching, flip-flop, and bilateral circuits



ELECTRICAL DATA

RATINGS, ABSOLUTE MAXIMUM, AT 25°C

	2N438	2N439	2N440	
Collector to base voltage, V_{CB}	30	30	30	volts
Emitter to base voltage, V_{EB}	25	25	25	volts
Total dissipation	100	100	100	mw
Derate approx. 2 mw per °C increase of ambient temperature				
Operating junction temperature	—50°C to 85°C			
Storage temperature	—50°C to 85°C			

ELECTRICAL CHARACTERISTICS AT 25°C

Static and Large Signal Parameters

		LIMITS			
	Type	Min.	Mode	Max.	
Cutoff Collector Current, I_{CBO} $V_{CB} = 25V$	all		1.5	10	μAdc
Cutoff Collector Current, I_{CBO} $V_{CB} = 6V$, $T_A = 75°C$	all			150	μAdc
Cutoff Emitter Current, I_{EBO} $V_{EB} = 25V$	all		1.5	10	μAdc
Cutoff Emitter Current, I_{EBO} $V_{CB} = 6V$, $T_A = 75°C$	all			150	μAdc
Collector-Base Breakdown Voltage, BV_{CBO}, $I_C = 100\ \mu A$	all	30			Vdc

		LIMITS			
	Type	Min.	Mode	Max.	
Collector-Emitter Breakdown Voltage, BV_{CEO}, $I_C = 300\ \mu A$	2N438	25			Vdc
	2N439	20			Vdc
	2N440	15			Vdc
Current Gain — D.C., h_{FE} $I_C = 50$ mA, $V_{CE} = 1.0V$	2N438	20	25		—
	2N439	30	45		—
	2N440	40	70		—
Input Voltage, V_{EB} $I_C = 50$ mA, $V_{CE} = 1.0V$	2N438		0.37		Vdc
	2N439		0.32		Vdc
	2N440		0.27		Vdc
Saturation Resistance, Rs $I_c = 50$ mA	all		3	5	ohms

Typical Switching Characteristics‡

Parameter	2N438	2N439	2N440	
Rise time, tr	0.7	0.5	0.3	μsec
Fall time, tf	0.5	0.3	0.2	μsec
Storage time, ts	0.8	0.7	0.6	μsec

Low Frequency, small signal parameters†

		LIMITS		
	Type	Min.	Mode	
Current Gain, common emitter, h_{fe}	2N438	15	25	
	2N439	15	35	
	2N440	15	65	
Input Resistance, common base, h_{ib}	all		27	ohms
Input Resistance, common emitter, h_{ie}	2N438		1.0	K ohms
	2N439		1.5	K ohms
	2N440		2.5	K ohms

2N438 • 2N439 • 2N440 (cont.)

High Frequency, small signal parameters*

	Type	Min.	Mode	Max.	
		LIMITS			
Cutoff Frequency, $f_{\alpha b}$	2N438	2.5			Mc/s
	2N439	5.0			Mc/s
	2N440	10.0			Mc/s
Collector Capacitance, C_c	all	9	15		μμf
Extrinsic base resistance, r_b'	2N438		180		ohms
	2N439		220		ohms
	2N440		300		ohms
Collector base time constant, $r_b'C_c$	2N438		2000		μμsec
	2N439		2300		μμsec
	2N440		3000		μμsec
Power Gain, unilateralized, PG	2N438		29		
	2N439		32		
	2N440		35		

NOTES:

‡$i_c = 10$ mA, $i_{b1} = 1$ mA, $i_{b2} = 1$mA
†$V_{CB} = 6.0$Vdc, $I_E = 1.0$mAdc, $f = 270$c/s
*$V_{CB} = 6.0$Vdc, $I_E = 1.0$mAdc, $f = 455$Kc/s.

APPLICATION, EXAMPLES

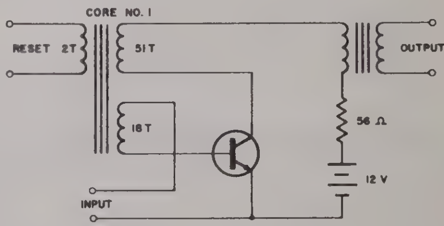
The high-current, short-pulse applications of transistors are numerous and their potentials can be illustrated by considering a transistor-core gate.

The basic transistor magnetic-core gate circuit shown can be explained as follows: If a pulse is applied to the reset winding, Core 1 is demagnetized or reset. Consequently, there will be coupling between the collector and base windings.

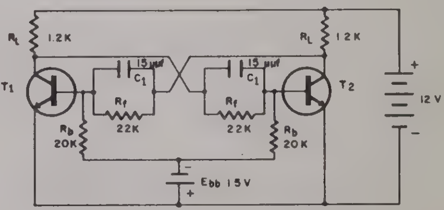
When an input pulse is applied, regenerative action causes a large pulse output and magnetizes Core 1 to saturation. Without further resetting, since the core is now saturated, the collector and base windings are not coupled. There will be no output pulse as there is no response to an input pulse.

Several transistor core gates can be connected in cascade to construct a shift register . . . binary counter or scales . . . decade counter or logic circuits, etc. The high-current pulse operation of transistors can also be used to drive magnetic heads for writing and reading.

CBS transistor 2N439 or 2N440 in a magnetic-core gate circuit. Each input pulse disables the circuit by a saturable magnetic core. It must then be reset before responding to another input pulse.



A typical flip-flop circuit using a pair of CBS 2N439's. This circuit resembles closely the Eccles-Jordan flip-flop vacuum tube circuit. The circuit has two stable states, transistor T_1 "on" and T_2 "off," and vice versa. The cross coupling capacitors C_1 permit triggering from one state to the other.

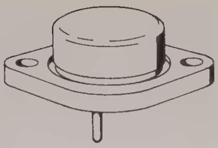


$$R_L \cong \frac{E_{cc}}{I_c \text{ ``on''}} \qquad \text{The coupling resistor } R_f = \frac{BR_b\, h_{FE}}{R_b I_c \text{ ``on'' } E_{bb} B}$$

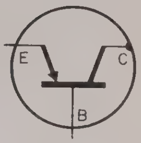
$$\text{where } h_{FE} = \frac{I_c \text{ ``on''}}{I_b \text{ ``on''}}$$

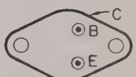
CBS

2N255
2N256



PNP power transistor
. . . metal case with plug in type
leads . . . designed for radio
amateurs and experimenters use†
. . . used in power output stage
of portable phonograph and mobile
public address systems





ELECTRICAL DATA

RATINGS, ABSOLUTE MAXIMUM, AT 25°C

	2N255	2N256	
Collector to base voltage, d-c●	−15	−30	volts
Emitter to base voltage, d-c	−15	−30	volts
Collector current, steady state d-c	−3	−3	amp
Dissipation, total in free air	1.5	1.5	watts
Derating per °C ambient temp. increase	.024	.024	watt
Dissipation, total with heat radiator▲	6.25	.625	watts
Derating per °C ambient temp. increase	0.1	0.1	watt
Operating temperature, junction	−40 to 85		°C
Storage temperature	−40 to 85		°C

TYPICAL CHARACTERISTICS AT 25°C

	2N255	2N256	
Collector current	−500	−500	ma
Collector voltage	−6	−12	volts
Base resistance	9 to 24		ohms
Alpha cutoff frequency, $F_{\alpha co}$	200	200	kc
Collector to base current amplification, d-c	30 to 50		
Saturation voltage, V_S, $I_C = 1.0$ amp	0.5	0.5	volts
Operating temp. gradient, junction and surface of copper base	3	3	°C/w

TYPICAL OPERATION AT 25°C■

Class A Amplifier (one unit, common emitter connected)

	2N255	2N256	
Collector supply voltage	−7	−14	volts
Collector to emitter voltage, d-c	−6	−12	volts
Collector current, d-c	−500	−500	ma
Base to emitter voltage, d-c	0.4 to 0.6		volts
Base current, d-c	−10 to −16		ma
Input resistance	10 to 25		ohms
Load resistance	14	28	ohms
Power output	1	2	watts
Total harmonic distortion	5 to 7		%
Power input	2 to 10		mw
Power gain	19 to 26	22 to 29	db

Push-Pull Class B Amplifier (common emitter connected)

Values for each unit	**2N255**	**2N256**	
Collector supply voltage ▽	−7	−14	volts
Collector current, zero signal	−50	−50	ma
Collector current, max. signal	−500	−500	ma
Peak collector current	−1500	−1500	ma
Base current, zero signal	−0.5 to −1.5		ma
Base current, max. signal	−10 to −16		ma
Dissipation, max. signal	0.8	1.6	watts
Input resistance	18 to 48		ohms
Load resistance	4	8	ohms
Power output □	5	10	watts
Power input □	25 to 150		mw
Power gain □	12 to 20	15 to 23	db

NOTES:

●These are peak values; the 2N255 and 2N256 should be operated from 6 and 12-volt batteries, respectively.

▲When operated within maximum rated power dissipation using a 6″ x 6″ x ⅛″ aluminum heat radiator, the temperature should not exceed 151°F (66°C) on the surface of the case.

■Use of an efficient heat radiator for operation at these conditions is imperative.

▽The supply voltages given for the 2N255 and 2N256 are those used in mobile operation, nominally -6 and -12 volts, respectively.

☐Values for both units.

†For circuits of various experimental applications send for CBS-Hytron booklet PA-16.

SPECIAL PURPOSE TUBES

This CBS Reference Guide for Transmitting and Special Purpose Tubes includes the majority of types that are in current demand.

Inclusion of a particular tube type does not indicate a preference for its use or a guarantee of availability from CBS-Hytron. For availability information, consult your CBS-Hytron Distributor.

These data have been selected for their maximum usefulness for quick reference. Characteristics given are average values and typical operations are those considered to be most common for the particular tube.

A tube type is easily found in these tables by using the index. If the classification of a tube is known, it can be quickly located by finding the appropriate table. (The tables are arranged in alphabetical order.)

Table I	Computer Tubes
Table II	Gaseous Diodes
Table III	Gaseous Triodes and Tetrodes
Table IV	Phototubes
Table V	Power Tetrodes, Pentodes, and Beam Tubes
Table VI	Power Triodes
Table VII	Receiving Tubes — Special Applications
Table VIII	Receiving Tubes — Military and Industrial
Table IX	Rectifiers
Table X	UHF Tubes

TYPE	TABLE	TYPE	TABLE	TYPE	TABLE
OA2	II	1P40	IV	3B25	IX
OA2WA	II	2A4G	III	3B28	IX
OA2WA, JAN	II	2C39B	X	3C23	III
OA2WA, USN	II	2C40	X	3D21A	V
OA3 (VR75)	II	2C43	X	3E29	V
OA4G	III	2D21	III	4X150A	V
OB2	II	2E22	V	4X150D	V
OB2WA	II	2E24	V	5R4GY	IX
OB2WA, JAN	II	2E25A	V	5Y3WGTA	IX
OB2WA, USN	II	2E26	V	6AJ5	VII
OB3 (VR90)	II	2E30	V	6AN5	V
OC3 (VR105)	II	2X2A	IX	6AS6	VII
OD3 (VR150)	II	3A4	VII	6AS7G	VII
1C21	III	3A5	VII	6AU6WA	VIII
1P39	IV	3B4	VII	6D4	III

SPECIAL PURPOSE TUBES (cont.)

TYPE	TABLE
6J4	X
6SL7WGT	VIII
6SN7WGT	VIII
6V6GTY	V
12A6	V
12AT7WA	VIII
12AY7	VII
26A7GT	VII
FG27A	III
HY69	V
83	IX
FG95	III
FG97	III
FG104	IX
575A	IX
673	IX
801A	VI
802	V
805	VI
807	V
809	VI
810	VI
811A	VI
813	V
814	V
815	V
816	IX
826	VI
828	V
829B	V
832A	V
833A	VI
837	V
838	VI
845	VI
857B	IX
866A	IX
868	IV
869B	IX
872A	IX
884	III
918	IV
921	IV
922	IV
923	IV
927	IV
929	IV
930	IV
931A	IV
955	X
HY1269	V
1614	V
1616	IX
1620	VII
1621	VIII
1622	V
1624	V
1625	V
1635	VII
2050	III
5513	VI
5514	VI
5516	V
5518	VI
5545	III
5560/FG95	III
5561/FG104	IX
5581	IV
5636	VIII
5651	II
5654	VIII
5654/6AK5W	VIII
5654/6AK5W/6096	VIII
5670	VIII
5675	X
5686	VIII
5687	VIII
5690	IX
5691	VIII
5692	VIII
5693	VIII
5696	III
5718	VIII
5719	VIII
5725	VIII
5725/6AS6W	VIII
5725/6AS6W/6187	VIII
5726/6AL5W/6097	IX
5749	VIII
5749/6BA6W	VIII
5750/6BE6W	VIII
5751	VIII
5763	V
5812	V
5814	VIII
5814A	VIII
5814WA	VIII
5823	III
5879	VII
5881	V
5894	V
5902	VIII
5915	I
5963	I
5964	I
5965	I
6004	IX
6005	VIII
6005/6AQ5W	VIII
6005/6AQ5W/6095	VIII
6012	III
6021	VIII
6072	VII
6080	VIII
6099	VIII
6101/6J6WA	VIII
6111	VIII
6112	VIII
6134	VIII
6135	VIII
6136	VIII
6146	V
6161	X
6197	I
6201	VIII
6202	IX
6211	I
6216	V
6265	VIII
6386	VIII
6463	I
6524	V
6626	II
6626/OA2WA	II
USN6626/OA2WA	II
6627	II
6627/OB2WA	II
USN6627/OB2WA	II
6663/6AL5	IX
6669	V
6677	VIII
6678	VIII
6680/12AU7	VIII
6681/12AX7	VIII
6792	V
6807	III
6830	II
6831	II
8008	IX
9001	X
9002	X
9003	X
9006	IX

TABLE I. CBS COMPUTER TUBES

	DESCRIPTION	CONSTRUCTION				CATHODE			SERVICE	CHARACTERISTICS AND TYPICAL OPERATION									
																Circuit Resistance, Ohms			
TYPE*	FEATURES AND NOTES	Basing	Base	Length, inches	Diameter, inches	Heater—Filament	Volts	Amperes	APPLICATION	Plate Supply Volts	Grid 1 Volts	Grid 2 & 4 Volts	Grid 3 Supply Volts	Plate Ma	Grid 2 & 4 Ma	Plate	Grid 1	Grid 3	TYPE*
5915	Pentagrid amplifier for use as a gated amplifier in computers. Grids 1 & 3 are independent control grids.	7CH	7-pin Min.	2⅛	¾	Htr.	6.3	0.3	Gated Amplifier G_1 Control, cutoff G_2 Control, cutoff "ON"	150 150 150	−10† 0 0	75 75 0	0 −10 0	0 0 5.8	0 14 9	20000 20000 20000	47000 47000 47000	47000 47000 47000	5915
5963	Medium-mu duotriode with a separate terminal for each cathode.	9A	9-pin Min.	2³⁄₁₆	⅞	Htr.	12.6 6.3	0.15 0.3	Freq. Halfer, cutoff "ON"	150 150	−15 0	— —	—	0 5.1	— —	20000 20000	47000 47000	— —	5963
5964	Medium-mu duotriode. Values are for each unit.	7BL	7-pin Min.	2⅛	¾	Htr.	6.3	0.45	Freq. Halfer, cutoff "ON"	150 150	−10 0	— —	— —	0 5.1	— —	20000 20000	47000 47000	— —	5964
5965	Medium-mu duotriode. Closely controlled cutoff bias balance between each unit. Values are for each unit. Separate terminals for each cathode.	9A	9-pin Min.	2³⁄₁₆	⅞	Htr.	12.6 6.3	0.225 0.45	Freq. Divider	150	Grid volts for I_b of 150 μa = −5.5; Difference between grid voltages of units for I_b of 150 μa/unit = 1.5 V maximum; Plate load resistance = 20,000 ohms								5965
										150	Grid volts for I_{c1} of 140 μa = less than 1 V; Plate current = 10.5 ma; Plate circuit resistance = 7200 ohms								
6197	Sharp cutoff power pentode; also designed for pulse amplifier circuits. Has a G_m of 11,000 μmhos.	9BV	9-pin Min.	2⅝	⅞	Htr.	6.3	0.65	Freq. Divider, cutoff "ON"	250▲ 250▲	−12 −3	150▲ 150▲	0 0	0 30	— —	— —	— —	— —	6197
6211	Medium-mu duotriode with a closely controlled cutoff bias balance between each unit. Each cathode has a separate terminal.	9A	9-pin Min.	2³⁄₁₆	⅞	Htr.	12.6 6.3	0.15 0.3	Freq. Divider, cutoff	150	Grid volts for I_b of 100 μa = −10 volts max. Difference between grid voltages of units for I_b of 100 μa/unit = 1.0 V maximum.								6211
									"ON"	150	0	—	—	5.15	—	20000	47000	—	
6463	Medium-mu duotriode with extremely high zero-bias plate current and sharp cutoff for each section.	9CZ	9-pin Min.	2⅝	⅞	Htr.	12.6 6.3	0.3 0.6	Freq. Divider	100 200 250	★ −11 0	— — —	— — —	29 1.0 14.5	— — —	— — 3850	— — —	— — —	6463

*All types listed are designed for "on-off" control usage during long periods of operation under cutoff conditions. Steady plate current is provided during "on" cycles. All types except the 5915 can be used in frequency divider circuits of electronic computers.

★ With grid current adjusted for 200 μa approx.

▲Voltages at electrode terminals.

†Grid 1 supply volts.

TABLE II. CBS GASEOUS DIODES (Voltage Regulator and Reference)

	DESCRIPTION		CONSTR.	MAXIMUM RATINGS				SERVICE	TYPICAL OPERATION				
					Operating Ma								
TYPE	FEATURES AND NOTES	Basing	Base†	Starting Current, Ma	Min.	Max. *	Ambient Temp. **	APPLICATION	Min. Supply Volts, D-C	Operating Volts, D-C	Max. Shunt Capacitor, μf	Regulation Average Volts	TYPE
OA2	Glow Tube — 150 Volts	5BO	7-pin Min.	75	5	30	−55 to +90°C	Voltage Regulator	185	150	0.1	2	OA2
OA2WA △	Glow Tube — 150 Volts	5BO	7-pin Min.		Same as 6626 below.			Voltage Reg. & Ref.	Same as 6626. Tested for military applications.				OA2WA
OA3(VR75)	Glow Tube — 75 Volts	4AJ	6-pin O.	100	5	40	−55 to +90°C	Voltage Regulator	105	75	—	5	OA3(VR75)
OB2	Glow Tube — 105 Volts	5BO	7-pin Min.	75	5	30	−55 to +90°C	Voltage Regulator	133	108	0.1	1	OB2
OB2WA △	Glow Tube — 105 Volts	5BO	7-pin Min.		Same as 6627 below			Voltage Reg. & Ref.	Same as 6627. Tested for military applications.				OB2WA
OB3(VR90)	Glow Tube — 90 Volts	4AJ	6-pin O.	—	5	30	—	Voltage Regulator	125	90	—	5	OB3(VR90)
OC3(VR105)	Glow Tube — 105 Volts	4AJ	6-pin O.	100	5	40	−55 to +90°C	Voltage Regulator	133	108	—	2	OC3(VR105)
OD3(VR150)	Glow Tube — 150 Volts	4AJ	6-pin O.	100	5	40	−55 to +90°C	Voltage Regulator	185	150	—	3.5	OD3(VR150)
5651	Glow Tube — 87 Volts	5BO	7-pin Min.	—	1.5	3.5	−55 to +90°C	Voltage Reference	115	87	0.02 Stability = 0.1 V	3.0 max.	5651
6626 △	Glow Tube — 150 Volts Reliable operation under adverse conditions.	5BO	7-pin Min.	75	5	30	−55 to +150°C	Voltage Regulator	165	148	0.1	2	6626
				—	6	10	−55 to +150°C	Voltage Reference	165	148	Stability = 0.2 V	0.5	
6627 △	Glow Tube — 105 Volts Reliable operation under adverse conditions.	5BO	7-pin Min.	75	5	30	−55 to +110°C	Voltage Regulator	130	108	0.1	1.5	6627
				—	6	10	−55 to +150°C	Voltage Reference	130	107	Stability = 0.2 V	0.2	

*Use sufficient series resistance to limit current at all times to not more than the rated values.

△ Also JAN and USN types.

†All miniature tubes listed are 2⅝ in. high and ¾ in. in diameter. The octal types are 4¼ in. high and 1⁹⁄₁₆ in. in diameter.

**Ambient temperature for tubes operated at maximum ratings; if ratings are decreased, the ambient temperature may be increased.

TABLE III. CBS GASEOUS TRIODES AND TETRODES (Cold Cathode and Thyratron)

	DESCRIPTION	CONSTRUCTION				CATHODE			SERVICE		MAX. RATINGS (Absolute Values)						
TYPE	FEATURES AND NOTES	Basing	Base	Length, inches	Diameter, inches	Heater–Filament	Volts	Amperes	APPLICATION	Approx. Tube Drop Volts	Temperature Range Ambient °C	Peak Forward Anode Volts	Peak Inverse Anode Volts	Peak Cathode Current, Amps	Average Cathode Current, Amps	Surge Current, Amps	TYPE
OA4G	Cold cathode gas triode for application in calculating machines and carrier current relay systems.	4V	6-pin O.	4⅛	1 9/16	Cold Cathode			Relay Service	70	Peak Starter Electrode Voltage = 75 to 90 V		225	0.10	.025	—	**OA4G**
1C21	Similar to OA4G but for d-c operation only.	4V	6-pin O.	2⅝	1 5/16	Cold Cathode			Relay Service	73	Peak Starter Electrode Voltage = 66 to 80 V		180	0.10	.025	—	**1C21**
2A4G	Control grid type gaseous triode.	5S	7-pin O.	4⅛	1 9/16	Fil.	2.5	2.5	Control Tube	15	−55 to +70	200	200	1.25	.10	–	**2A4G**
2D21	Gas tetrode with negative control operable in a high sensitivity circuit directly from a high-vacuum phototube.	7BN	7-pin Min.	2⅛	¾	Htr.	6.3	0.6	Grid-Controlled Rectifier Relay Tube	8	−75 to +90 −75 to +90	650 400	1300 Grid 1 Resistance = 1 meg	0.5	.10	10	**2D21**
3C23	Mercury-vapor triode thyratron with negative control.	3G	4-pin	6⅛	2 1/16	Fil.	2.5	7.0	Relay Control	15	−40 to +80*	1250	1250	6.0	1.5	120	**3C23**
6D4	Gas triode for application as a relay tube or relaxation oscillator.	5AY	7-pin Min.	2⅛	¾	Htr.	6.3	0.25	Relay Service	16	−55 to +90	350	350	0.11	.025	—	**6D4**
FG27A	Mercury-vapor thyratron with negative control for use in relay circuits. Requires only a small amount of grid power.	4CF	4-pin	7¼	3	Fil.	5.0	4.5	Relay Service	16	−40 to +80	1000	1000	10	2.5	200	**FG27A**
FG95	See data for 5560/FG95																**FG95**
FG97	Mercury-vapor, double grid thyratron for use where grid power is small and actuation of the grid from a high impedance source is desired.	FG97	4-pin	6¾	2 7/16	Fil.	2.5	5.0	Relay Service	16	+40 to +80*	1000	1000	2.0	0.5	40	**FG97**
884	Gas type triode with negative control. Recommended for new equipment design.	6Q	6-pin O.	4⅛	1 9/16	Htr.	6.3	0.6	Relaxation Oscillator	14	−75 to +90 For Relaxation Oscillator (Sweep Circuit Service): Peak Anode Volts = 300. Peak Cathode Amps = 0.3.	350	—	0.3	0.075	—	**884**

TABLE III. (continued) Gaseous Triodes and Tetrodes

	DESCRIPTION	CONSTRUCTION				CATHODE			SERVICE		MAX. RATINGS (Absolute Values)						
TYPE	FEATURES AND NOTES	Basing	Base	Length, inches	Diameter, inches	Heater–Filament	Volts	Amperes	APPLICATION	Approx. Tube Drop Volts	Temperature Range Ambient °C	Peak Forward Anode Volts	Peak Inverse Anode Volts	Peak Cathode Current, Amps	Average Cathode Current, Amps	Surge Current, Amps	TYPE
2050	Gas type tetrode with negative control which can be operated directly from a high-vacuum phototube.	6BS	8-pin O.	4⅛	1⁹⁄₁₆	Htr.	6.3	0.6	High Sensitivity Relay Control	8	−75 to +90	650	1300	1.0	0.1	10	**2050**
											Grid 1 Circuit Resistance = 10 meg. max.						
5545	Gas filled triode with negative control used for control applications.	4BZ	4-pin	9	2⅝	Fil.	2.5	21	Control Tube	16	−55 to +70	1500	1500	80	6.4	1120	**5545**
5560/FG95	Mercury-vapor triode thyratron with negative control characteristics. Low grid power requirement.	4CD	4-pin	7¹⁵⁄₁₆	2¼	Htr.	5.0	4.5	Relay Control and Ignitor Firing	16	−40 to +80*	1000	1000	15	2.5	200	**5560/FG95**
5696	Gas type tetrode thyratron for relay applications such as counter circuits where low heater current gain and short deionization time are important	7BN	7-pin Min.	1¾	¾	Htr.	6.3	0.15	High Sensitivity Relay Control	10	−55 to +90	500	500	0.1	.025	2	**5696**
										Typical Operating Conditions for Relay Service: A-C Anode Volts (RMS) = 117 V Peak Grid Signal Volts = 5 V Grid 1 Bias Volts (RMS) = 5 V Grid 1 Circuit Resistance = 0.1 meg.							
5823	Glow discharge, cold cathode type for "on-off" control of low current electrical circuits.	4CK	7-pin Min.	2⅛	¾	Cold Cathode			Relay Service		Peak Anode and Starter Electrode Volts (Inverse and Forward) = 200 V Peak Starter Electrode Breakdown Volts = +73 to +105V						**5823**
6012	Negative control thyratron for relay and grid controlled rectifier service, especially motor control and low-power inverter service.	6CO	6-pin O.	4¼	1²¹⁄₃₂	Htr.	6.3	2.6	Relay Service	10	−75 to +90	650	1300	5.0	0.5	20	**6012**
6807	Negative control gas triode for control applications.	6807	4-pin	9	2⅝	Fil.	2.5	21	Control Tube	16	−55 to +70	1500	1500	80	6.4	1120	**6807**

*Condensed Mercury °C

TABLE IV. CBS PHOTOTUBES

	DESCRIPTION	CONSTRUCTION				SPECTRAL CHARAC.		MAX. RATINGS					I_b Dark	LUMINOUS SENSITIVITY‡			
						Max. Response								μa/Lumen			
TYPE	FEATURES AND NOTES	Basing	Base	Length, inches	Diameter, inches	Wavelength Angstroms	Sensitivity μa/μ watt	Anode Supply D-C or Peak A-C Volts	Peak Cathode Current, μa	Peak Cathode Current Density μa/sq. in.	Average Cathode Current, μa*	Gas Amplification Factor	Max. D-C; μa ★	0 cps	5000 cps	10000 cps	TYPE
1P39	Vacuum type similar to type 929 except for non-hygroscopic base. For high humidity conditions. Blue sensitive.	3J	6-pin O.	3 1/16	1 9/32	4000	.042	250	20	100	5	—	.005	45	45	45	1P39
1P40	Gas type similar to 930 except for non-hygroscopic base. For high humidity conditions. Red sensitive.	3J	6-pin O.	3 1/16	1 9/32	8000	.0135	90	10	100	3△	10	.005	135	111	101	1P40
868	Gas type phototube for the reproduction of sound.	2K	4-pin	4⅛	1⅛	8000	.009	100	20	100	5▲	8	.10	90	77	67	868
918	Used for the reproduction of sound, for relay controls, and for measurements. Red sensitive.	2K	4-pin	4⅛	1⅛	8000	.015	90	20	100	5△	10.5	.10	150	120	105	918
921	Gas cartridge type for relay applications and light measurements. Red sensitive.	2AQ	Spec.	1 23/32	⅞	8000	.0135	90	10	100	3△	10	.10	135	119	108	921
922	Cartridge vacuum type for relay applications. Red sensitive.	2AQ	Spec.	1 23/32	⅞	8000	.002	500	15	100	5	—	.005	20	20	20	922
923	For replacement purposes. Types 1P40 or 930 recommended for new equipment. Gas type.	2K	4-pin	3 9/16	1 3/16	8000	.0135	90	10	100	3△	10	.10	135	111	101	923
927	Gas type for 16 mm. sound equipment, relay and measurement applications.	2F	Spec.	2 13/32	21/32	8000	.0125	90	6	100	2△	10	.10	125	110	100	927

TABLE IV. (continued) Phototubes

	DESCRIPTION			CONSTRUCTION		SPECTRAL CHARAC.		MAX. RATINGS					I_b Dark	LUMINOUS SENSITIVITY‡			
						Max. Response								µa/Lumen			
TYPE	FEATURES AND NOTES	Basing	Base	Length, inches	Diameter, inches	Wavelength Angstroms	Sensitivity µa/µ watt	Anode Supply D-C or Peak A-C Volts	Peak Cathode Current, µa	Peak Cathode Current Density µa/sq. in.	Average Cathode Current, µa*	Gas Amplification Factor	Max. D-C; µa ★	0 cps	5000 cps	10000 cps	TYPE
929	Vacuum type for light measurement and relay application. Blue sensitive.	3J	6-pin O.	3 1/16	1 9/32	4000	.042	250	20	100	5	—	.125	45	45	45	929
930	Gas type for sound reproduction and relay use. Red sensitive.	3J	6-pin O.	3 1/16	1 9/32	8000	.0135	90	10	100	3△	10	.10	65	56	50	930
931A	High sensitivity multiplier type used in facsimile transmission, sound reproduction, and research. Blue sensitive.	11K	Spec.	3 11/16	1 5/16	4000	18600	1250	Supply Volts between Final Dynode & Anode = 250 Peak Anode Ma = 10 Average Anode Ma = 1.0 Ambient Temp. = 75°C D-C Anode Dark Current = 0.1 µa Anode Luminous Sensitivity ☐ = 20 amp/lumen Equivalent Noise Input ☐ = 7 x 10^{-12} lumens Current Amplification ☐ ▼ = 1 x 10^{-6}								931A
5581	Gas type similar to 930. Designed for sound reproduction from a dye-image sound track used with an incandescent light source.	3J	6-pin O.	3 1/16	1 9/32	4000	.125	100	10	100	3▲	5.5	.05	135	124	108	5581

☐ With 100 volts/dynode stage and 90 volts between final dynode and anode.

△ May be doubled when anode supply voltage is limited to 70 volts.

★ At 90 volts for all gas types; 250 volts for all vacuum types at 25°C

▲ May be doubled when anode supply voltage is limited to 80 volts.

*Averaged over any interval of 30 seconds maximum.

▼ Ratio of anode sensitivity to cathode sensitivity.

‡Measured with 2870°K light source

TABLE V. CBS POWER TETRODES, PENTODES, AND BEAM TUBES

TYPE		DESCRIPTION		CONSTRUCTION			CATHODE			SERVICE		MAX. RATINGS (CCS unless noted)□			TYPICAL OPERATION							TYPE
	Max. Plate Watts	FEATURES AND NOTES	Basing	Base	Length, Inches	Diameter, Inches	Heater—Filament	Volts	Amperes	APPLICATION ▼	Frequency in Mc for Full Input	Plate Volts	Screen Volts	Screen Watts	Plate Volts	Screen Volts	Grid Volts	Plate Ma†	Screen Ma†	Grid Ma, D-C	Drive Watts	Output Watts	
2E22	30	Pentode power amplifier and oscillator. Filament type for mobile service.	5J	5-pin	6⅛	2 1/16	Oxide Fil.	6.3	1.5	CT*	—	750	250	10	500	250	−60△	100	16	6.0	.55	34	**2E22**
										CT*	—				750	250	−60△	100	16	6.0	.55	53	
										Supp. Mod. Amp.	—				750	250	−65△	55	29	6.0	.60	16.5	
2E24	13.5	VHF beam power amplifier. Filament type for mobile service.	7CL	8-pin O.	3 21/32	1 5/16	Oxide Fil.	6.3	0.65	CP*	6.5	500	200	2.3	400	180	−45	50	8	2.5	.15	13.5	**2E24**
															500	180	−45	54	8	2.5	.16	18	
										CT*	6.5	600	200	2.5	400	200	−45	75	10	3.0	.19	20	
															600	195	−50	66	10	3.0	.21	27	
2E25A	15	Beam power pentode with a quick heating filament for mobile service.	5BJ	8-pin O.	4 3/16	1 7/16	Oxide Fil.	6.0	0.7	CT	100	450	250	4.0	450	250	−45	75	15	3.0	.27	20	**2E25A**
															450	250	−70	75	15	3.0	.36	22	
	10									CP	100	400	225	2.7	400	225	−70	60	8.5	3.0	.33	75	
2E26	13.5	High efficiency beam power pentode with full ratings up to 125 Mc.	7CK	8-pin O.	3 21/32	1 5/16	Htr.	6.3	0.8	CT*	125	600	200	2.5	600	185	−45	66	10	3.0	.17	27	**2E26**
										CP*	125	500	200	2.3	500	180	−50	54	9	2.5	.15	18	
2E30	6.6	Quick heating beam power pentode for AF application and RF power use with full ratings up to 160 Mc in mobile service.	7CQ	7-pin Min.	2⅝	¾	Oxide Fil.	6.0	0.65	CP	165	200	200	2.5	200	200	−46	45	10	2.3	.15	5	**2E30**
	10									CP	165	300	250	2.5	300	250	−70	50	5.5	0.7	1.7	6	
	10									CT Doubler	165	300	250	2.5	300	225	−70	45	3.8	0.7	.20	4.5	
										AB_2 Audio★		300	275	2.5	250	250	−30	120	20	2.3	.20	17	
3A4	2	Power pentode capable of delivering 1.2 watts power output at 10 Mc in RF amplifier service. Dry cell type.	7BB	7-pin Min.	2⅛	¾	Oxide Fil.	2.8	0.1	Class A Amp.	—	150	90	0.4	150	90	−8.4	13.3	2.2	—	—	0.7	**3A4**
	2							1.4	0.2	RF Power Amp.	10	150	135	0.9	150	135	RG = 0.2 meg	18.3	6.5	0.13	—	1.2	
3B4	3	VHF beam power amplifier for portable equipment. Full ratings to 100 Mc.	7CY	7-pin Min.	2⅛	¾	Oxide Fil.	2.5	0.165	CT	100	150	135	1.1	90	90	−18	15	4.8	0.4	0.03	.45	**3B4**
								1.25	0.33						150	135	−38	25	6.2	0.55	0.07	1.25	

TABLE V. (continued) Power Tetrodes, Pentodes, and Beam Tubes

	DESCRIPTION			CONSTRUCTION				CATHODE		SERVICE	MAX. RATINGS (CCS unless noted)□				TYPICAL OPERATION								
TYPE	Max. Plate Watts	FEATURES AND NOTES	Basing	Base	Length, Inches	Diameter, Inches	Heater – Filament	Volts	Amperes	APPLICATION ▼	Frequency in Mc for Full Input	Plate Volts	Screen Volts	Screen Watts	Plate Volts	Screen Volts	Grid Volts	Plate Ma†	Screen Ma†	Grid Ma, D-C	Drive Watts	Output Watts	TYPE
3D21A	15	High vacuum pulse modulator and blocking oscillator.	6BU	8-pin O.	4 13/16	1 13/16	Htr.	6.3 12.6	1.7 0.85	Pulse Modulator Characteristics (Static)	—	3500	850	3.0	Transient Peak Plate = 5000 V; P_{cl} = 0.5 W; Pulse = 10 μs 3500 600	800 300	−150 −30	30	R_L = 450 ohms; E sig = 150 V G_m = 5500 μmhos			21000	**3D21A**
3E29	15	High perveance, twin unit beam power tube for rectangular wave pulse modulator service.	7BP	7-pin Septar	4 5/16	2 3/8	Htr.	6.3 12.6	2.25 1.125	Modulator Service	MAXIMUM RATINGS FOR RECTANGULAR WAVE MODULATOR SERVICE (Units in parallel) Duty Factor between .0001 and 1.0 D-C Plate Supply Volts = 5000 V Peak Current = 10 A						Averaging Time = 1200 μs Plate Input = 85 W Plate Dissipation = 15 W						**3E29**
4X150A	100	Forced air cooled UHF tetrode for use as a power amplifier or oscillator, and as a wide-band video amplifier in TV transmitters. Typical operation up to 165 Mc.	4X150A	Spec.	2 15/32	1 21/32	Htr.	6.0	2.6	CP (55% Mod.) CT (55% Mod.)	500 500	1000 1250	300 300	12 12	400 1000 1250	250 250 250	−90 −105 −90	200 200 200	40 20 20	7 15 11	1 2 1.2	55 140 195	**4X150A**
4X150D	100	Forced air cooled UHF tetrode. Same as 4X150A except for heater characteristics.	4X150D	Spec.	2 15/32	1 21/32	Htr.	26.5	0.57	CP (55% Mod.) CT (55% Mod.)	500 500	1000 1250	300 300	12 12	400 1000 1250	250 250 250	−90 −105 −90	200 200 200	40 20 20	7 15 11	1 2 1.2	55 140 195	**4X150D**
6AN5	4.2	Pentode power amplifier for wide-band RF or video service. Operates on low plate voltage.	7BD	7-pin Min.	2 1/8	3/4	Htr.	6.3	0.5	A_1 Audio	—	120	120	1.4	120	120	—	35	12	—	—	1.3	**6AN5**
6V6GTY	8	Beam power pentode. Rugged 6V6GT with low-loss phenolic base.	7AC	7-pin O.	3 5/16	1 5/16	Htr.	6.3	0.45	CT	10	350	250	2.0	350	250	−100	47	7	5	—	11	**6V6GTY**
12A6	—	Beam power amplifier.	7AC	7-pin O.	3 5/16	1 5/16	Htr.	12.6	0.15	A_1 Audio	250 A-C Plate Ohms = 70000	250	7.5	1.5	250	250 G_m = 3000 μmhos	−12.5	32	3.5 Load Ohms = 7500	—	—	3.4	**12A6**

HY69	25 30	Quick heating beam power pentode for use in AF and RF mobile service. Has a 5-pin medium base.	5J	5-pin	5¾	2⅙	Thor. Fil.	6.0	1.6	CP CT	 60	600 600	300 300	3.3 5.0	600 500 500 400	250 250 250 250	−100 −100 −100 −100	100 100 83 80	12.5 12.5 12.5 12.5	6.0 6.0 5.5 5.5	1.0 1.0 0.9 0.9	42 33 29 22.5	**HY69**
802	6.7	Power pentode featuring high output with low driving power. Small cap with medium 7-pin bayonet base.	6BM	7-pin	5¾	2⅙	Htr.	6.3	0.9	CP (E_{c3} = 40 V) CT (E_{c3} = 0 V)	30 30	400 500	200 250	4.0 6.0	400 500	195 250	−40 −100	35 45	17 12	1.5 2	0.1 0.25	8 16	**802**
807	16.5	Air cooled beam power amplifier. Features low grid driving power and high power sensitivity. Has a medium 5-pin base.	5AW	5-pin	5¾	2⅙	Htr.	6.3	0.9	CP CT	60 60	475 600	300 300	2.5 3.5	475 325 600 400	225 225 250 250	−85 −75 −45 −45	83 80 100 100	5 5 7 7.5	4 3 3.5 3.5	0.4 0.25 0.2 0.2	27.5 17.5 40 25	**807**
813	67 100	Beam power amplifier designed for use as a high power final amplifier with extremely high power sensitivity. Neutralization is unnecessary in adequately shielded circuits.	5BA	7-pin	7½	2⁹⁄₁₆	Thor. Fil.	10.0	5.0	CP CT	30 30	1600 2000	400 400	15 22	1600 2000	300 400	−160 −120	150 180	30 45	12 10	2.7 1.9	180 275	**813**
814	50 65	Beam power amplifier with a zirconium coated anode, medium 5-pin micanol base and small cap.	5J	5-pin	7¹¹⁄₁₆	2⅙	Thor. Fil.	10.0	3.25	CP* CT	30 30	1250 1500	400 400	6.7 10	1250 1500	300 300	−150 −90	144 150	1.0 —	1.8 15	2.0 1.5	130 160	**814**
815	20 25	Double beam pentode for low power amateur or commercial transmitters with full ratings up to 150 Mc.	8BY	8-pin O.	4⁹⁄₁₆	2⅜	Htr.	6.3 12.6	1.6 0.8	CP★ CT★	150 150	325 400	225 225	4.0 4.5	325 400	165 145	−45 −45	123 150	16 17	4 4.5	0.2 0.23	30 44	**815**
828	47 70 70	Beam power amplifier for class AB_1 audio amplifier service or RF amplifier service. Low driving power requirements. Medium micanol base.	5J	5-pin	7¹¹⁄₁₆	2⅙	Thor. Fil.	10.0	3.25	CP CT AB_1 Audio★	30 30 -	1000 1250 1750	400 400 750	11 16 16	1000 1250 1700	400 400 750	−140 −95 −120	135 160 248	23 35 43	10 12 E_{c3} =	2.1 2.1 60 V	100 150 300	**828**
829B	21 30	Double beam pentode with full ratings up to 200 Mc and up to 250 at 89% ratings.	7BP	7-pin Septar	3⁵⁄₁₆	2⅜	Htr.	6.3 12.6	2.25 1.125	CP★ CT★	200 200	600 750	225 225	7 7	600 750	200 200	−70 −50	112 120	26 34	8 8	0.6 0.45	50 65	**829B**
832A	10	Double beam pentode having high efficiency at very high frequencies. Full ratings up to 250 Mc.	7BP	7-pin Septar	3⁵⁄₁₆	2⅜	Htr.	6.3 12.6	1.6 0.8	CP CT	200 200	600 750	250 250	3.4 5.0	600 750	200 200	−65 −65	36 48	16 15	2.6 2.8	0.16 0.19	17 26	**832A**
837	8 12	Pentode for use as an RF amplifier, a frequency multiplier or oscillator. Medium micanol bayonet base.	6BM	7-pin	5¾	2⅙	Htr.	12.6	0.7	CP (E_{c3} = 40 V) CT (E_{c3} = 40 V)	20 20	400 500	200 200	5 8	400 500	140 200	−40 −75	45 60	20 15	5 4	0.3 0.4	11 22	**837**
HY1269	30	Quick heating pentode for portable and mobile equipment.	5BL	5-pin	5¾	2⅙	Thor. Fil.	6.0 12.0	3.2 1.6	CT CP	60 60	750 600	300 300	5 3.3	750 600	300 250	−100 −100	120 100	15 12.5	6 6	0.9 0.9	63 42	**HY1269**

TABLE V. (continued) Power Tetrodes, Pentodes, and Beam Tubes

		DESCRIPTION	CONSTRUCTION				CATHODE			SERVICE		MAX. RATINGS (CCS unless noted)□			TYPICAL OPERATION								
TYPE	Max. Plate Watts	FEATURES AND NOTES	Basing	Base	Length, Inches	Diameter, Inches	Heater—Filament	Volts	Amperes	APPLICATION ▼	Frequency in Mc for Full Input	Plate Volts	Screen Volts	Screen Watts	Plate Volts	Screen Volts	Grid Volts	Plate Ma†	Screen Ma†	Grid Ma, D-C	Drive Watts	Output Watts	TYPE
1614	14	Beam power pentode in metal envelope. Full ratings up to 80 Mc.	7AC	7-pin O.	4 5/16	1 5/8	Htr.	6.3	0.9	CP CT	80 80	375 375	300 300	2.5 3.5	325 375	245 250	−40 −40	70 80	8 10	2 2	0.1 0.1	15 21	**1614**
1622	13.8	Beam power pentode, similar to type 6L6, for applications requiring continuous service.	7AC	7-pin O.	4 5/16	1 5/8	Htr.	6.3	0.9	A_1 P-P Audio★	—	300	250	1.4	300	250	−20	86	4	—	—	10	**1622**
1624	16.5 25	Quick heating beam pentode for medium power AF and RF service. Except for having a filament, it is similar to type 807.	4BE	5-pin	5 3/4	2 1/16	Fil.	2.5	2.0	CP CT	60 60	500 600	300 300	2.5 2.5	500 600	275 300	−50 −60	75 90	9 10	3.3 5	0.25 0.43	24 35	**1624**
1625	16.5	Identical to type 807 except for 12.6-volt heater and its base.	5AZ	7-pin	5 3/4	2 1/16	Htr.	12.6	0.45		Maximum ratings and typical operation same as for type 807.												**1625**
5516	15	Quick heating pentode for VHF mobile equipment.	7CL	8-pin O.	3 21/32	1 7/16	Oxide Fil.	6.0	0.7	AB_2 Audio★ CP CT	— 80 156	600 475 600	250 250 250	5.0 3.3 5.0	600 475 450	250 250 250	−25 −90 −40	140 63 75	24 10 15	4 4 2	0.16 0.5 2.0	10.5 22 21	**5516**
5763	12 12 12 8	Beam power pentode for mobile transmitters or low-power stages of fixed transmitters. Used in doubler or tripler service.	9K	9-pin Min.	2 5/8	7/8	Htr.	6.0	0.75	CT CT Doubler CT Tripler CP	50 175 175 30	300 300 300 250	250 250 250 250	2.0 2.0 2.0 1.5	300 300 300 250	250 250 250 250	−60 −75 −100 −39	50 40 35 40	5.0 4.0 5.0 5.6	3 1.0 1.0 1.0	0.35 0.6 0.6 0.05	7 2.1 1.3 6.4	**5763**
5812	10	Quick heating beam pentode for mobile or portable equipment.	7CQ	7-pin Min.	2 5/8	3/4	Oxide Fil.	6.0	0.65	CT Static	160 —	300	250	2.5	300 250	200 250	−45 −24.5	55 40	3.0 1.8	0.75† R_p = 63K	1.5 G_m = 4300	7	**5812**
5881	23 23 23	Beam pentode, shock and vibration resistant. Used in high fidelity amplifiers, etc. Electrically similar to type 6L6.	7AC	7-pin O.	3 15/32	1 7/16	Htr.	6.3	0.9	A_1 Audio AB_1 Audio★ AB_2 Audio★	— — —	400 400 400	400 400 400	3.0 3.0 3.0	350 360 360	250 270 270	−18 −22.5 −22.5	65 140 205	8.5 11.0 16.0	G_m = 5200 — —	 — —	11.3 18 47	**5881**

5894	27 40 40	Double beam pentode for push-pull RF or tripler service. 120 watts input up to 250 Mc and 100 watts input up to 470 Mc.	5894	7-pin Septar	4 5/16	1 5/16	Htr.	6.3 12.6	1.8 0.9	CP★ CT & FM★ CT Tripler	250 250 462	450 600 400	250 250 220	4.5 7.0 7.0	450 600 400	250 250 220	−100 −80 −175	150 200 140	16 16 5	5 2 5	0.6 4 8	50 85 16	**5894**
6146	20 20 20 13.3	VHF beam pentode for RF amplifier and oscillator service, and modulator service. Full ratings to 60 Mc and 66% rating to 175 Mc.	7CK	8-pin O.	3 13/16	1 23/32	Htr.	6.3	1.25	AB₁ Audio★ CT CT CP	— 60 175 60	600 600 600 480	250 250 250 250	3.0 3.0 3.0 2.0	600 600 320 475	180 150 180 135	−45 −58 −51 −77	200 112 140 94	23 9 10 6.4	R_L = 2.8 2.0 2.8	7K 0.2 3.0 0.3	82 52 25 34	**6146**
6216	10	High perveance beam pentode for filter reactor service, regulated supply pass tube, RF amplifier etc. Rugged construction.	9CE	9-pin Min.	2 5/8	7/8	Htr.	6.3	1.2	Filter Reactor CT CT Doubler	 50 50	300 300 300	200 200 200	1.0 1.0 1.0	100 300 300	100 150 150	−3 −50 −75	72 63 50	3 8 6	R_p = 18.5K 2.0 1.0	 0.3 0.6	G_m = 12800 8.8 4.0	**6216**
6524	13.5 20	Double beam pentode for RF amplifier or tripler service up to 470 Mc.	6524	7-pin Septar	3 9/16	1 11/16	Htr.	6.3	1.25	CP★ CP★ CT★	100 462 100	400 — 500	300 — 300	2.0 — 3.0	400 300 500	200 200 200	−61 −60 −44	100 75 120	7 4 8	2.5 1.0 3.7	0.2 7 0.2	31 9 46	**6524**
6669	12 12	Beam power pentode for AF application in mobile equipment. Electrically equivalent to the 6AQ5.	7BZ	7-pin Min.	2 5/8	3/4	Htr.	6.3	0.45	A₁ Audio AB₁ Audio★	—	250 250	250 250	2.0 2.0	250 250	250 250	−12.5 −15	45 79	45 13	— —	— —	4.5 10	**6669**
6792	25	Beam tetrode for high voltage control in the range from 5000 to 25000 volts.	8GL	8-pin O.	5 1/16	1 23/32	Htr.	6.3	0.45	Shunt Regulator Characteristics	Tetrode Triode	25K 25K	350 —	1.0 —	25K 25K	200 —	−18 −8.4	1.0 1.0	0.1 —	— —	— —	— —	**6792**

▲ Explanation of abbreviations in APPLICATION column:

- A₁ Audio — Class A₁ Audio Frequency Amplifier or Modulator.
- AB₁ Audio — Class AB₁ Audio Frequency Amplifier or Modulator.
- AB₂ Audio — Class AB₂ Audio Frequency Amplifier or Modulator.
- CT — Class C Telegraphy Power Amplifier and Oscillator.
- CP — Class C Plate Modulated Amplifier (100% Modulation).

†Current for audio applications is at maximum signal input.

★ Push-pull operation, values for two tubes or two units.

☐ CCS — Continuous Commercial Service.

*Intermittent Mobile Service.

△E_{c3} for CT operation is 22.5 V; E_{c3} for suppressor modulated amplifier is —90 V.

NOTE: If ICAS (Intermittent Commercial and Amateur Service) ratings and operation are required, write to Technical Information Service, CBS-Hytron, Danvers, Mass.

TABLE VI.

CBS POWER TRIODES

	DESCRIPTION	CONSTRUCTION					CATHODE		USE		MAX. RATINGS (Absolute Max.) ▲			CHARACTERISTICS—TYPICAL OPER.									
TYPE	FEATURES AND NOTES	Basing	Base	Length, inches	Diameter, inches	Filament*	Volts	Amperes	APPLICATION†	Frequency in Mc for Full Input	Plate Volts	D-C Input Watts	Plate Dissipation Watts	Plate Volts	Grid Volts	Peak Grid Volts	Plate Amps	Grid Amps, D-C	Plate-to-Plate Load Resistance Ohms	Amplification	Driving Watts	Output Watts	TYPE
3A5	Medium-mu duotriode capable of delivering 2 watts power output at 40 Mc in push-pull class C service. Powered by dry cells. Values are for each unit.	7BC	7-pin Min.	2⅛	¾	Oxide Fil.	1.4 2.8	0.22 0.11	A Audio★ CT★	— 40	135 135	— 2.0	0.5 1.0	90 135	−2.5 −20	— 90	.0037 .03	.0022 .0065	— —	15 —	— 0.2	— —	**3A5**
801A	Medium-mu triode with bayonet base. Especially for use in small aircraft transmitters. Air cooled.	4D	4-pin	5⅜	2 7/16	T.T.	7.5	1.25	B CP CT	— 60 60	600 500 600	42 30 42	20 13.5 20	600 500 600	−75 −190 −150	320 — —	.008 .055 .065	— .015 .015	10000 — —	8 — —	3 4.5 4	45 18 25	**801A**
805	High-mu, zero bias class B modulator having high power output at low-plate voltage. Jumbo base and medium cap. Air cooled.	3N	4-pin	8½	2 5/16	T.T.	10	3.25	B CP CT	— 30 30	1500 1250 1500	315 220 315	125 85 125	1500 1250 1500	−16 −160 −105	280 — —	.084 .16 .20	— .06 .04	8200 — —	Variable —	7 16 8.5	370 140 215	**805**
809	Air cooled, high perveance, high-mu type having high efficiency but requiring only low driving power. Medium micanol bayonet base and medium cap.	3G	4-pin	6 9/16	2 7/16	T.T.	6.3	2.5	B☐ CP☐ CT☐	— 60 60	1000 750 1000	100 75 100	30 25 30	1000 750 1000	−16 −60 −75	156 — —	.04 .10 .10	- .032 .025	11600 — —	50 — —	2.7 4.3 2.8	145 55 75	**809**
810	Air cooled, high perveance type with high plate efficiency but requiring only low driving power and relatively low plate voltage. Has a jumbo base, skirted end cap, and medium side cap.	2N	4-pin	8¾	2¼	T.T.	10	4.5	B☐ CP☐ CT☐	— 30 30	2750 2000 2500	510 500 750	175 125 175	2250 2000 2500	−60 −350 −180	380 550 350	.07 .25 .30	— .07 .06	11600 — —	36 — —	13 35 19	725 380 575	**810**
811A	Improved 811. Plate design increases dissipation capability and ratings for plate current and input. Air cooled type with medium micanol base, medium cap, and zirconium coated plate.	3G	4-pin	6 21/32	2 7/16	T.T.	6.3	4.0	B☐ CP☐ CT☐	30 30	1500 1250 1500	235 175 260	65 45 65	1500 1250 1500	−4.5 −120 −70	170 250 330	.032 .14 .173	— .045 .173	12400 — —	160 — —	4.4 10 7.1	340 135 200	**811A**

826	Air cooled UHF type with high efficiency. Has a center-tapped filament, zirconium coated plate, and a medium molded-flare base.	7BO	7-pin Septar	3¹¹⁄₁₆	2⅜	T.T.	7.5	4.0	CP☐ CT☐	250 250	1000 1000	95 130	45 55	1000 1000	−160 −70	320 183	.095 .13	.04 .035	— —	31 —	11.5 5.8	70 90	**826**
833A	Forced air cooled, 100 watt triode with a zirconium plated anode and special post terminals.	833A	Spec.	8¹³⁄₁₆	4¹⁹⁄₃₂	T.T.	10	10	B CP CT	— 30 30	3000 2500 3000	1125 835 1250	300 200 300	3000 2500 3000	−70 −300 −200	400 460 360	0.1 .335 .415	— .075 .055	— — —	— — —	20 30 20	1650 635 1000	**833A**
838	Air cooled, high mu, zero bias class B modulator with high power output and low distortion. Jumbo base.	4E	4-pin	7⅞	2⁹⁄₁₆	T.T.	10	3.25	B CP CT	— 30 30	1250 1000 1250	220 175 220	100 67 100	1250 1000 1250	0 −135 −90	200 255 200	.148 .15 .15	— .06 .03	9000 — —	Variable —	7.5 16 6	260 100 130	**838**
845	Air cooled modulator and AF power amplifier. Jumbo base.	4E	4-pin	7⅞	2⁹⁄₁₆	T.T.	10	3.25	AB$_1$ Audio	—	1250	150	100	1250	−225	440	.04	—	6600	5.3	—	115	**845**
5513	Forced air cooled, grounded-grid RF amplifier and oscillator capable of dissipating 1200 watts. Full ratings up to 220 Mc.	5513	Spec.	7½	3	T.T.	6.3	30	CBT CT	220 —	3000 4000	3300 3600	1200 1200	2000 3750	−20 −150	240 250	.967 .94	.18 .159	— —	220 —	223 377	1125 2690	**5513**
5514	All-purpose power triode with high mu allowing low or zero bias operation. Replaces types HY30Z, HY40, HY40Z, HY51A, HY51B and HY51Z.	4BO	4-pin	6⁹⁄₁₆	2⁷⁄₁₆	T.T.	7.5	3.0	CT CP B	60	1500	262.5	65	1500 1250 1500	−106 −84 −4.5	197 172 146	.175 .142 .35	.06 .06 .088	— — 10500	— — —	12 10 6.5	200 135 400	**5514**
5518	Transmitting triode for use as a grounded-grid class C RF amplifier.	5518	Spec.	11¹¹⁄₁₆	5½	T.	6.3	235	CT	—	7000	12000	4000	6600	−520	940	1.3	0.20	—	145	180	6500	**5518**

†Explanation of abbreviations in APPLICATION column:

A Audio — Class A Audio Frequency Amplifier or Modulator.

AB$_1$ Audio — Class AB$_1$, Audio Frequency Amplifier or Modulator.

B — Class B Push-Pull Audio Frequency Modulator.

CBT — Class B Television.

CP — Class C Plate Modulated Amplifier (100% Modulation).

CT — Class C Telegraphy Power Amplifier and Oscillator.

★ Design Center Values.

∗ Thoriated tungsten filament (T.T.); pure tungsten filament (T.)

☐ ICAS (Intermittent Commercial and Amateur Service).

▲ Values shown are CCS (Continuous Commercial Service) unless otherwise noted.

TABLE VII. CBS RECEIVING TUBES (Special Application)

	DESCRIPTION	CONSTRUCTION				CATHODE			SERVICE	CHARACTERISTICS AND TYPICAL OPERATION										
TYPE	FEATURES AND NOTES	Basing	Base	Length, inches	Diameter, inches	Heater–Filament	Volts	Amperes	APPLICATION	Plate Supply Volts	Grid 1 Volts	Grid 2 Supply Volts	Plate Ma	Grid 2 Ma	A-C Plate Resistance, Ohms	Transconductance	Amplification	Load Resistance, Ohms	Output Watts	TYPE
6AJ5	Sharp cutoff pentode voltage amplifier. 28-volt-plate version of type 6AK5.	7BD	7-pin Min.	1⅜	¾	Htr.	6.3	0.175	RF Amp.	28	−1.0	28	2.7	1.0	100,000	2500	—	—	—	6AJ5
6AS6	Sharp cutoff pentode with grid 1 & grid 3 control for application in delay circuits, gated amplifier circuits and gain controlled amplifier circuits.	7CM	7-pin Min.	1¾	¾	Htr.	6.3	0.175	Class A Amp.	120	−2.0	120	5.2	3.5	110,000	3200	—	—	—	6AS6
6AS7G	Low-mu duotriode with high perveance and an A-C plate resistance of 280 ohms. Used as a regulator tube in d-c power supplies, a d-c amplifier, etc.	8BD	8-pin O.	5⁵⁄₁₆	2¹⁄₁₆	Htr.	6.3	2.5	D-C Amp.		Maximum Ratings Plate Volts = 250 Plate Diss. = 13 Plate Ma = 125 Peak Heater — Cathode Volts = + or − 300 Grid Circuit Resistance for Cathode Bias Op. = 1 meg.									6AS7G
12AY7	Medium-mu duotriode for application in the first stages of audio amplifiers.	9A	9-pin Min.	2³⁄₁₆	⅞	Htr.	12.6 6.3	0.15 0.3	Class A Amp.	250	−4.0	—	3.0	—	22,800	1750	40	—	—	12AY7
26A7GT	Twin beam power tube for use with low voltage B+power supplies.	8BU	8-pin O.	3¹³⁄₁₆	1⁹⁄₃₂	Htr.	26.5	0.6	Class A Amp.* AB$_1$ Audio	26.5 26.5	−4.5 −7.0	26.5 26.5	20 19	1.9 2.0	— —	5700 —	— —	1500 2500	0.18 0.5	26A7GT
1620	Sharp cutoff pentode similar to 6J7. For use where microphonics is critical. Metal type with a miniature cap.	7R	7-pin O.	3⅛	1⁵⁄₁₆	Htr.	6.3	0.3	Class A Amp. (Pentode)	100 250	−3.0 −3.0	100 100	— 5.3	0.5 0.5	1 meg >1 meg	1185 1225	— —	— —	— —	1620
1635	High-mu power duotriode for Class B amplifier applications.	8B	8-pin O.	3⁵⁄₁₆	1⁵⁄₁₆	Htr.	6.3	0.6	Class B Amp.‡	300	0	—	6.6	—	1,000	—	—	12,000	10.4	1635
5879	Sharp cutoff pentode used as an audio amplifier in which reduced hum, microphonics, leakage and noise are desirable.	9AD	9-pin Min.	2³⁄₁₆	⅞	Htr.	6.3	0.15	Class A Amp. (Pentode) Class A Amp. (Triode)†	250 100	−3.0 −3.0	100 —	1.8 2.2	0.4 —	2 meg 17,000	— 1240	— 21	— —	— —	5879
6072	Low noise, low microphonic duotriode used primarily in the low-level stages of high gain AF amplifiers	9A	9-pin Min.	2³⁄₁₆	⅞	Htr.	6.3 12.6	0.35 0.175	Class A Amp.* Low Level Amp.*	250 150	−4.0 Plate Load Resistor = 20,000 ohms Cathode Resistor = 2700 ohms Voltage Gain = 12.5	—	3.0	—	25,000	1750 Grid Resistor = 0.1 meg. Cathode Capacitor = 40 μf	44	—	—	6072

	DESCRIPTION			CONSTRUCTION			CATHODE		MAX. RATINGS (Design Center)				USE	CHARACTERISTICS—TYPICAL OPER.										
TYPE	FEATURES AND NOTES	Basing	Base	Length, inches	Diameter, inches	Heater–Filament	Volts	Amperes	Plate Volts	Screen Volts	Plate Watts	Screen Watts	APPLICATION	Plate Volts	Screen Volts	Grid Volts, D-C	Plate Ma	Screen Ma	Plate Resistance Ohms	Transconductance	Load Resistance Ohms	Amplification	Output Watts	TYPE
6AU6WA	Sharp cutoff pentode RF or IF amplifier where reliable operation is required.	7BK	7-pin Min.	2⅛	¾	Htr.	6.3	0.3	300	150	3.0	.65	Class A Amp.	250	150	68△	10.6	4.3	1 meg	5200	—	—	—	**6AU6WA**
6SL7WGT	Rugged high-mu duotriode for RC amplifier or phase inverter service.	8BD	8-pin O.	3⁵⁄₁₆	1⁹⁄₃₂	Htr.	6.3	0.3	250	—	1.0†	—	Class A Amp.†	250	—	−2	2.3	—	44,000	1600	—	70	—	**6SL7WGT**
6SN7WGT	Rugged medium-mu duotriode for voltage amplifier or phase inverter service.	8BD	8-pin O.	3⁵⁄₁₆	1⁹⁄₃₂	Htr.	6.3	0.6	300	—	2.5†	—	Class A Amp.†	90 250	— —	0 −8	10 9	— —	6,700 7,700	3000 2600	— —	20 20	— —	**6SN7WGT**
12AT7WA	Medium-mu duotriode high frequency oscillator and mixer for service where reliability of performance is desired.	9A	9-pin Min.	2³⁄₁₆	⅞	Htr.	6.3 12.6	.30 .15	300	—	2.5†	—	Class A Amp.†	250 180	— —	−2 −1	10 11	— —	10,900 9,400	5500 6000	— —	60 62	— —	**12AT7WA**
1621	Power pentode for applications where continuity of service is required.	7S	7-pin O.	3¼	1⁵⁄₁₆	Htr.	6.3	0.7	300	300	7.9	1.9	Push-Pull Class A Amp.‡	300	300	−30	38	6.5	—	—	4000▲	—	—	**1621**
5636	Subminiature dual-control pentode for use as a gated or gain-controlled amplifier.	8DC	Submin.	Bulb 1.375	⁷⁄₁₆	Htr.	6.3	0.15	165	155	.55	.45	Class A Amp.	100	100	150△	5.6	4	110,000	3200	—	—	—	**5636**
5654	High-frequency pentode amplifier similar to type 6AK5, designed for military use.	7BD	7-pin Min.	1¾	¾	Htr.	6.3	0.175	180	140	1.5	0.5	Class A Amp.	120	120	−2	7.5	2.5	.3 meg	5000	—	—	—	**5654**
5654/6AK5W	High-frequency pentode amplifier similar to type 6AK5, designed for military use.	7BD	7-pin Min.	1¾	¾	Htr.	6.3	0.175	180	140	1.5	0.5	Class A Amp.	120	120	−2	7.5	2.5	.3 meg	5000	—	—	—	**5654/6AK5W**
5654/6AK5W /6096	Reliable USAF version of type 5654.	7BD	7-pin Min.	1¾	¾	Htr.	6.3	0.175	180	140	1.5	0.5	Class A Amp.	120	120	−2	7.5	2.5	.3 meg	5000	—	—	—	**5654/6AK5W /6096**
5670	Medium-mu duotriode. Military or industrial version of type 2C51.	8CJ	9-pin Min.	1¾	⅞	Htr.	6.3	0.35	300	—	1.5†	—	Class A Amp.†	150	—	240△	8.2	—	—	5500	—	35	—	**5670**

TABLE VIII. (continued) Receiving Tubes - Military and Industrial

TYPE	DESCRIPTION		CONSTRUCTION			CATHODE			MAX. RATINGS (Design Center)				USE	CHARACTERISTICS—TYPICAL OPER.										TYPE
	FEATURES AND NOTES	Basing	Base	Length, inches	Diameter, inches	Heater—Filament	Volts	Amperes	Plate Volts	Screen Volts	Plate Watts	Screen Watts	APPLICATION	Plate Volts	Screen Volts	Grid Volts, D-C	Plate Ma	Screen Ma	Plate Resistance Ohms	Transconductance	Load Resistance Ohms	Amplification	Output Watts	
5686	Beam power pentode for AF or RF service up to 160 Mc. Rugged construction for critical industrial and military applications.	9G	9-pin Min.	2³⁄₁₆	⅞	Htr.	6.3	0.35	250	250	7.5	3.0	Class A Amp. Class C Amp.	250 250	−12.5 −50	27 40	3.0 10.5	45000	— R_{g1} = 25000	— Drive = 0.15W	—	— —	— 6.5	**5686**
5687	Medium-mu duotriode. General purpose amplifier with high perveance and high emission.	9H	9-pin Min.	2³⁄₁₆	⅞	Htr.	6.3 12.6	0.9 0.45	300	— —	4.2† 7.5§	— —	Class A Amp.	250 120	— —	−12.5 −2	12.5 36	— —	3,000 1,700	5500 11000	— —	16.5 36	— —	**5687**
5691	High-mu duotriode. Long-life 6SL7GT for use in industrial applications.	8BD	8-pin O.	2⅞	1⁹⁄₃₂	Htr.	6.3	0.6	250	—	0.9†	—	Class A Amp.†	250	—	−2	2.3	—	44,000	1600	—	70	—	**5691**
5692	Medium-mu duotriode. Long-life 6SN7GT for industrial service.	8BD	8-pin O.	2⅞	1⁹⁄₃₂	Htr.	6.3	0.6	250	—	1.6†	—	Class A Amp.†	250	—	−9	6.5	—	9,100	2200	—	20	—	**5692**
5693	Reliable, long-life sharp-cutoff pentode, improved 6SJ7.	8N	8-pin O.	2⅝	1⁵⁄₁₆	Htr.	6.3	0.3	300	125	2.0	0.3	Class A Amp.	250	100	−3	3.0	.00085	1 meg	1650	—	—	—	**5693**
5718	Rugged subminiature medium-mu triode for service up to 500 Mc.	8DK	Submin.	Bulb 1.375	0.4	Htr.	6.3	0.15	150	—	0.8	—	Class A Amp.	100 150	— —	150△ 180△	8.5 13	— —	4,650 4,150	— —	— —	27 27	— —	**5718**
5719	Rugged subminiature high-mu triode for AF service.	8DK	Submin.	Bulb 1.375	0.4	Htr.	6.3	0.15	150	—	0.09	—	Class A Amp.	150	—	680△	1.7	—	26,000	—	—	70	—	**5719**
5725	Reliable sharp-cutoff dual-control pentode for use in gated or gain controlled amplifier.	7CM	7-pin Min.	1¾	¾	Htr.	6.3	0.175	180	140	1.5	0.5	Class A Amp.	120	120	−2	5.2	3.5	—	3200	—	—	—	**5725**
5725/6AS6W	Reliable sharp-cutoff dual-control pentode for gated amplifier use.	7CM	7-pin Min.	1¾	¾	Htr.	6.3	0.175	180	140	1.5	0.5					Same as 5725							**5725/6AS6W**
5725/6AS6W /6187	Reliable USAF version of type 5725	7CM	7-pin Min.	1¾	¾	Htr.	6.3	0.175	180	140	1.5	0.5					Same as 5725							**5725/6AS6W /6187**

57	Rem pento or IF is the reliable version of type 6BA6.	7B	Min.		¾			0.3		140			Cl p.			68△			meg		—	—	—	**5749**
5749/6BA6W	Remote cutoff pentode for RF or IF service. It is designed for reliable operation in mobile and aircraft applications.	7BK	7-pin Min.	2⅛	¾	Htr.	6.3	0.3	300	140	3.0	0.6	Class A Amp.	250	100	68△	11	4.2	1 meg	4400	—	—	—	**5749/6BA6W**
5750/6BE6W	Reliable 6BE6; pentagrid converter for military use.	7CH	7-pin Min.	2⅛	¾	Htr.	6.3	0.3	300	100	1.1	1.1	Converter	100 250	100 100	−1.5 −1.5	7.5 7.5	— —	.4 meg 1.0 meg	455 475	— —	— —	— —	**5750/6BE6W**
5751	High-mu duotriode; reliable version of type 12AX7.	9A	9-pin Min.	2³⁄₁₆	⅞	Htr.	6.3 12.6	0.35 0.175	300	—	0.7†	—	Class A Amp.†	250	—	−3	1.0	—	58,000	1200	—	70	—	**5751**
5814	Medium-mu duotriode which is a reliable version of type 12AU7.	9A	9-pin Min.	2³⁄₁₆	⅞	Htr.	6.3 12.6	0.35 0.175	300	—	2.75†	—	Class A Amp.	100 250	— —	0 −8.5	11.8† 10.5†	— —	6,250 7,700	3100 2200	— —	19.5 17	— —	**5814**
5814A	Medium-mu duotriode tested for military use. Reliable version of 12AU7.	9A	9-pin Min.	2³⁄₁₆	⅞	Htr.	6.3 12.6	0.35 0.175	300	—	2.75†	—	Class A Amp.†	100 250	— —	0 −8.5	11.8 10.5	— —	6,250 7,700	3100 2200	— —	19.5 17	— —	**5814A**
5814WA	Same as 5814A. Tested for military aircraft use. Reliable version of 12AU7.	9A	9-pin Min.	2³⁄₁₆	⅞	Htr.	6.3 12.6	0.35 0.175	300	—	2.75†	—					Same as 5814A							**5814WA**
5902	Subminiature beam power pentode for dependable industrial or military operation.	8DE	Submin.	Bulb 1.75	.4	Htr.	6.3	0.45	150	140	3.6	.9	Class A Amp.	110	110	270△	30	2.2	15,000	4200	3000	—	1.0	**5902**
6005	Beam pentode specially designed to assure dependable life and reliable service.	7BZ	7-pin Min.	2⅝	¾	Htr.	6.3	0.45	250	250	12	2	Class A Amp. Class AB Push-Pull‡	180 250 250	180 250 250	−8.5 −12.5 −15	30 47 35	4 7 13	58,000 52,000 60,000▲	3700 4400	5500 5000 10,000▲	— — —	2.0 4.5 10	**6005**
6005/6AQ5W	Reliable beam power pentode for military use.	7BZ	7-pin Min.	2⅝	¾	Htr.	6.3	0.45	250	250	12	2					Same as 6005							**6005/6AQ5W**
6005/6AQ5W/6095	Reliable USAF version of the 6005 beam power pentode.	7BZ	7-pin Min.	2⅝	¾	Htr.	6.3	0.45	250	250	12	2					Same as 6005							**6005/6AQ5W/6095**
6021	Subminiature medium-mu duotriode for general purpose applications where reliable performance is required.	8DG	Submin.	Bulb 1.375	.4	Htr.	6.3	0.30	150	—	1.0†	—	Class A Amp.†	100	—	150△	6.5	—	6,500	5400	—	35	—	**6021**
6080	Reliable low-mu duotriode with reduced susceptibility to electrolysis.	8BD	8-pin O.	4¹⁄₁₆	1²³⁄₃₂	Htr.	6.3	2.5	230	—	13†	—	D-C Amp.†	135 250	— —	250△ -200	125 10m	— —	— —	7000 —	— —	— —	— —	**6080**
6099	USAF version of 6101/6J6WA with balanced sections.						Same as 6101/6J6WA except maximum I_b difference of 0.25 ma when I_{1b} = 1.0 ma																	**6099**

TABLE VIII. (continued) Receiving Tubes - Military and Industrial

	DESCRIPTION		CONSTRUCTION				CATHODE		MAX. RATINGS (Design Center)				USE	CHARACTERISTICS—TYPICAL OPER.										
TYPE	FEATURES AND NOTES	Basing	Base	Length, inches	Diameter, inches	Heater–Filament	Volts	Amperes	Plate Volts	Screen Volts	Plate Watts	Screen Watts	APPLICATION	Plate Volts	Screen Volts	Grid Volts, D-C	Plate Ma	Screen Ma	Plate Resistance Ohms	Transconductance	Load Resistance Ohms	Amplification	Output Watts	TYPE
6101/6J6WA	Reliable 6J6 (duotriode) for military aircraft use. Electrically identical to type 6099 except that the sections are not balanced.	7BF	7-pin Min.	2⅛	¾	Htr.	6.3	0.45	300	—	1.6	—	Class A Amp. Class C Amp. and Osc. Mixer	100 150 150	— — —	50△ −10 810△	8.5 30 4.8	— I_{c1} = 16 ma —	7,100 Drive = .35 W 10,200	5300 G_c = 1900	— Osc. Peak = 3 V	38 —	— 3.5	**6101/6J6WA**
6111	Subminiature medium-mu duotriode for general purpose applications or high frequency oscillator-mixer service.	8DG	Submin.	Bulb 1.375	.4	Htr.	6.3	0.30	150	50	1.0†	—	Class A Amp.†	100	—	220△	8.5	—	4,000	5000	—	20	—	**6111**
6112	Subminiature high-mu duotriode for dependable operation as a voltage amplifier or phase inverter.	8DG	Submin.	Bulb 1.375	.4	Htr.	6.3	0.30	150	50	0.5†	—	Class A Amp.†	100 150	— —	1500△ 820△	.8 1.75	— —	39,000 28,000	1800 2500	— —	70 70	— —	**6112**
6134	Sharp-cutoff pentode with high transconductance for use in wide-band RF or IF amplifiers or as a video amplifier. Specially designed for dependability and reliability.	8N	8-pin O.	2⅝	1⁵⁄₁₆	Htr.	6.3	0.45	300	300	3.0	0.38	Class A Amp.	300	150	160△	10	2.5	1 meg	9000	—	—	—	**6134**
6135	Rugged medium-high mu triode for use as a high frequency oscillator or a general purpose amplifier.	6BG	7-pin Min.	2⅛	¾	Htr.	6.3	0.175	300	—	3.5	—	Class A Amp.	100 250	— —	0 −8.5	11.8 10.5	— —	6,250 7,700	3100 2200	— —	19.5 17	— —	**6135**
6136	Sharp-cutoff, high-transconductance pentode for use in RF or IF amplifier applications. Specially designed and tested for dependability and reliability.	7BK	7-pin Min.	2⅛	¾	Htr.	6.3	0.30	300	300	3.0	0.65	Class A Amp.	100 250	100 150	150△ 68△	5 10.6	2.1 4.3	.5 meg 1.0 meg	3900 5200	— —	— —	— —	**6136**
6201	High-mu duotriode for VHF amplifier and converter applications.	9A	9-pin Min.	2³⁄₁₆	⅞	Htr.	6.3 12.6	0.30 0.15	300	—	2.5	—	Grounded-Grid Amp.	100 250	— —	270△ 200△	3.3 10	— —	14,500 10,900	4000 5500	— —	57 60	— —	**6201**

6265	Sharp-cutoff pentode for wide-band, high frequency amplifier application.	7CM	7-pin Min.	2⅛	¾	Htr.	6.3	0.175	300	300	2.0	0.5	Class A Amp.	250	150	100△	7.4	2.9	1 meg	4600	—	—	—	**6265**
6386	Remote cutoff, medium-mu duotriode for use as a cascode RF, IF amplifier, or mixer.	8CJ	9-pin Min.	1¾	⅞	Htr.	6.3	0.35	300	—	1.5	—	UHF Voltage Amp.	100	—	100△	9.6	—	4,250	4000	—	17	16	**6386**
6677	Power pentode for mobile communications equipment. Similar to type 6CL6	9BV	9-pin Min.	2⅝	⅞	Htr.	6.3	0.65	330	330	8.5	2.0	Class A Amp.	250	150	—3	30	7	.15 meg	11000	2800	—	2.8	**6677**
6678	Medium-mu triode and sharp-cutoff pentode for oscillator-mixer service in mobile equipment.	9AE	9-pin Min	2³⁄₁₆	⅞	Htr.	6.3	0.45	330 330	330 —	3.0 3.0	0.55 —	Pentode Class A Triode Class A	250 150	110 —	68△ 56△	10 18	3.5 —	.4 meg 5.000	5200 8500	— —	— —	— —	**6678**
6680/12AU7	Medium-mu duotriode for mobile communications equipment. Similar to type 12AU7.	9A	9-pin Min.	2³⁄₁₆	⅞	Htr.	6.3 12.6	0.30 0.15	300	—	3.0†	—	Class A Amp.†	100 250	— —	0 -8.5	11.8 10.5	— —	6.500 7,700	3100 2200	— —	20 17	— —	**6680/12AU7**
6681/12AX7	High-mu duotriode for use in resistance coupled voltage amplifiers, phase inverters, and multivibrators for mobile equipment.	9A	9-pin Min.	2³⁄₁₆	⅞	Htr.	6.3 12.6	0.30 0.15	330	—	1.1†	—	Class A Amp.†	100 250	— —	−1 −2	0.5 1.2	— —	80.000 62.500	1250 1600	— —	100 100	— —	**6681/12AX7**

△ Cathode resistor in ohms. ‡Values for two tubes. ▲Plate to plate. §Both sections. †Each section. m Maximum

TABLE IX. CBS RECTIFIERS

	DESCRIPTION	CONSTRUCTION					CATHODE			MAX. PLATE RATINGS (Absolute Max. unless noted)			OPER. CONDITIONS (Single Phase F-W 2 Tubes)				
TYPE	FEATURES AND NOTES	Basing	Base	Length, inches	Diameter, inches	Heater – Filament	Volts	Amperes	Temperature Range Condensed Mercury °C	Peak Inverse Volts	Peak Amperes	Average Amperes	Peak Inverse Volts	Plate Supply Volts Max. A-C P-to-P	D-C Output Volts to Filter	Max. D-C Output Amperes	TYPE
2X2A	H-W vacuum type rectifier with small 4-pin base and small cap. For equipment subject to excessive shock and vibration.	4AB	4-pin	4 17/32	1 9/16	Htr.	2.5	1.75	—	12500†	.06†	.0075†	—	5500	4500	.002 ▲	**2X2A**
3B25	H-W Xenon rectifier with medium bayonet base and medium cap.	4P	4-pin	6 5/16	2 1/16	Fil.	2.5	5.0	−75 to +90*	4500	2.0	0.5	4500	3000	1400	1.0	**3B25**
3B28	H-W Xenon rectifier with small 4-pin bayonet base and medium cap.	4P	4-pin	6 5/32	2 1/16	Fil.	2.5	5.0	−75 to +90*	1000 5000	1.0 2.0	0.25 0.5	10000 5000	7000 3400	3200 1600	0.5 1.0	**3B28**
5R4GY	F-W vacuum type rectifier with coated filament and micanol base for application in low power transmitter stages.	5T	5-pin O.	5 5/16	2 1/16	Fil.	5.0	2.0	—	2800†	0.65†	0.175 †‡	—	1800 1900	1060 810	0.15 ▲ 0.175‡	**5R4GY**
5Y3WGTA	F-W vacuum type rectifier for equipment subject to excessive shock and vibration. Full ratings up to 65,000 feet.	5T	5-pin O.	3 3/8	1 5/16	Fil.	5.0	2.0	—	1400†	1.8†	0.375†	—	800 1000	345 390	.125 ▲ .125‡	**5Y3WGTA**
83	F-W mercury vapor rectifier for use in D-C power supplies.	4C	4-pin	5 3/8	2 1/16	Fil.	5.0	3.0	20 to 60	1705‡ 1705 ▲	1.1‡ 1.1 ▲	248‡ 248 ▲	— —	1180‡ 990 ▲	— —	248‡ 248 ▲	**83**
FG104	See 5561/FG104																**FG104**
575A	H-W mercury vapor rectifier.	4AT	4-pin	11 1/16	3 7/8	Fil.	5.0	10.0	20 to 50	15000	6.0	1.5	—	—	4800	1.5	**575A**
673	H-W mercury vapor rectifier with super jumbo, 4-pin bayonet base and medium cap.	2P	4-pin	11 3/8	3 3/16	Fil.	5.0	10.0	25 to 50 25 to 55 30 to 50	15000 10000 15000	6.0 7.0 10.0	1.5 1.75 2.5	15000 10000 —	10600 7000 —	4800 3200 —	3.0 3.5 —	**673**
816	H-W mercury vapor rectifier with small 4-pin base and cap.	4P	4-pin	4 11/16	1 9/16	Fil.	2.5	2.0	20 to 60	7500	0.5	0.125	7500	5200	2400	0.25	**816**
857B	H-W mercury vapor rectifier with special terminal connections and skirted large cap.	857B	Spec.	19 7/8	7 1/8	Fil.	5.0	30	30 to 40 25 to 60	22000 10000	40 40	10 10	22000 10000	15400 7000	7000 3200	20 20	**857B**

866A	H-W mercury vapor rectifier with small 4-pin bayonet base and ceramic insulated medium cap.	4P	4-pin	6 9/16	2 7/16	Fil.	2.5	5.0	25 to 60 25 to 70 25 to 80	10000 5000 2500	1.0 1.0 2.0	0.25 0.25 0.5	10000 5000 2500	7000 3400 1600	3200 1600 800	0.5 0.5 1.0	**866A**
869B	H-W mercury vapor rectifier with special end mountings and skirted large caps.	869B	4-pin	14 7/16	5⅛	Fil.	5.0	19.0	30 to 40 30 to 50 30 to 60	20000 15000 10000	10.0 10.0 10.0	2.5 2.5 2.5	20000 15000 10000	14000 10600 7000	6300 4700 3100	5.0 5.0 5.0	**869B**
872A	H-W mercury vapor rectifier with jumbo 4-pin base and ceramic insulated medium cap.	4AT	4-pin	8½	2 5/16	Fil.	5.0	7.5	20 to 60 20 to 70	10000 5000	5.0 5.0	1.25 1.25	10000 5000	7000 3400	3200 1600	2.5 2.5	**872A**
1616	H-W vacuum type rectifier with coated filament, small 4-pin base and medium cap. For transmitters requiring quick operation.	4P	4-pin	6 13/16	2 1/16	Fil.	2.5	5.0	—	6000	0.8	0.13	—	—	—	—	**1616**
5561/FG104	H-W mercury vapor rectifier for welder-control service with maximum averaging time of 15 seconds. Super jumbo 4-pin bayonet base.	5561/ FG104	4-pin	11¼	3 13/16	Htr.	5.0 Welder Control	10.0	40 to 80 25 to 50	3000 10000	40 16	6.4 4.0	3000 Surge current 160A for 0.1 sec max.	2000	950	12.8	**5561/FG104**
5690	F-W vacuum rectifier with full ratings up to 40,000 feet and a life expectancy of over 10,000 hours. Each unit has its own heater and cathode.	5690	8-pin O.	4¼	1 23/32	Htr.	12.6 6.3	1.2 2.4	—	1120	.375▽	62.5	—	700‡ 700▲	305‡ 415▲	.0075‡ .055▲	**5690**
5726/6AL5W /6097	F-W rectifier with controlled plate current balance and rugged construction for industrial or military use.	7CM	7-pin	1¾	¾	Htr.	6.3	0.3	—	360	.06▽	.01▽	—	117▽ $Z_L = 300\,\Omega$ ▽ .009▽			**5726/6AL5W /6097**
6004	F-W vacuum type rectifier which is a JAN approved version of type 5Y3GT. Has two plate caps.	2AJ	5-pin O.	4 1/16	1 5/16	Fil.	5.0	2.0	—	1400†	1.8†	0.375†	—	800 1000	345 390	.125▲ .125‡	**6004**
6202	F-W vacuum type rectifier intended for use in power supplies having low D-C output current requirements. Ratings up to 60,000 feet.	5BS	7-pin Min.	2⅝	¾	Htr.	6.3	0.6	—	1250★ 850△	1.45†	0.2†	—	450‡ 325▲ Operating Conditions given above are for altitudes up to 40,000 feet.	375‡ 365▲	.050‡ .050▲	**6202**
6663/6AL5	High perveance duodiode suitable for use in low-current applications. Specifically designed for mobile communications equipment, this tube withstands appreciable on-off cycling.	6BT	7-pin Min.	1¾	¾	Htr.	6.3	0.3	—	250	.054▽	.009▽	Tube Voltage Drop at I_b = 60 ma/plate = 10 volts.				**6663/6AL5**
8008	H-W mercury vapor rectifier.	2P	4-pin	8¾	2 5/16	Fil.	5.0	7.5	20 to 60 20 to 70	10000 5000	5.0 5.0	1.25 1.25	10000 5000	7000 3400	3200 1600	2.5 2.5	**8008**
9006	Miniature H-W UHF rectifier.	6BH	7-pin Min.	1 13/16	¾	Htr.	6.3	0.15	—	750	.015	.005	—	270	—	.005	**9006**

*Ambient temperature.
▲Capacitor input.
†Design Center Value.
☐Excluding flexible leads.
‡Choke input.
▽Per plate.
★Altitudes up to 40,000 feet.
△Altitudes from 40,000 to 60,000 feet.

TABLE X. CBS UHF TUBES (Receiving and Transmitting)

	DESCRIPTION	CONSTRUCTION					CATHODE		MAX. RATINGS					USE	CHARACTERISTICS—TYPICAL OPER.											
TYPE	FEATURES AND NOTES	Basing	Base	Length, inches	Diameter, inches	Heater–Filament	Volts	Amperes	Frequency in Mc for Full Input	Plate Volts	Screen Volts	Plate Watts	Screen Watts	APPLICATION▲	Plate Volts	Screen Volts	Grid 1 Volts	Plate Ma	Screen Ma	Grid Ma, D-C	Transconductance, µmhos	Plate Resistance, Ohms	Amplification	Driving Watts	Output Watts	TYPE
2C39B	Forced air cooled, high mu triode with integral radiator. For use as an amplifier, oscillator, and frequency multiplier. Useful up to 2500 Mc and above in cathode drive circuits.	2AN	Spec.	2¾	1¹¹⁄₆₄	Htr.	6.3	1.0	2500 2500	1000 600	— —	100 70		CT CP	900 600	— —	−22 −150	90 100	— —	27 50	— P_g = 2 W	—	— —	6 —	17 —	**2C39B**
2C40	Air cooled, lighthouse triode for use as an RF amplifier up to 1200 Mc and a CW oscillator up to 3370 Mc.	6BY	6-pin O.	2⁹⁄₁₆	1⁵⁄₁₆	Htr.	6.3	0.75	3370	500	-	6.5	—	CT	250	—	−5	20		0.3	–	—	36	—	.075	**2C40**
2C43	Air cooled, lighthouse triode for use as a CW oscillator up to 1500 Mc.	6BY	6-pin O.	2¹¹⁄₁₆	1⁵⁄₁₆	Htr.	6.3	0.9	1500 1500	500 3500	— —	12 12	— —	CT‡ CT, pulsed‡	470 3000	— —	— --	38 2400 ip = 2.5 A	—	—	— f = 1 K_c	— Pulse = 1 µsec	48	—	9 1300 pk	**2C43**
6J4	Miniature triode for use as a grounded-grid UHF amplifier up to 500 Mc.	7BQ	7-pin Min.	2⅛	¾	Htr.	6.3	0.4	500	150	—	2.25	—	Grounded Grid Class A Amp.	150	R_k = 100 ohms		15	—	—	12000	4500	55	—	—	**6J4**
955	Medium-mu triode for use up to 600 Mc.	5BC	Acorn	1⅜	1⁵⁄₃₂	Htr.	6.3	0.15	600	180	—	1.6		RF Amp. & Osc.	180	—	−35	7	—	1.5	—	—	—	—	0.5 at 60 Mc	**955**
5675	Medium-mu triode for use as a Class C RF power amplifier and oscillator up to 3000 Mc. Pencil type tube.	5675	Spec.	2¹⁷⁄₆₄	⁵³⁄₆₄*	Htr.	6.3	0.135	3000 1700	300 165	— —	9 5	-- -	Class A Amp. Cathode Drive Osc. at 1700 Mc.	135 120	R_k = 68 R_g = 20,000		24 25	— —	— 4.0	6200 —	3225 —	20 —	— —	— 0.475	**5675**
6161	Forced air cooled, radiator type triode for CW and TV use. Coaxial electrode structure for cathode drive circuits of the coaxial cylinder type.	2AN	Spec.	3¹³⁄₃₂	1¾	Htr.	6.3	3.4	900 900 900	1600 1600 1600	— — —	250 250 250	--	CTF CM, Doubler to 900 Mc CBT	1650† 1675† 1600†	— —	150† 175† 100† Sync level conditions per tube. Band width, 6 Mc.	250 250 350	— — —	50 21 40	— — —	— — —	— — —	80 100 75	180 140 230	**6161**
9001	Sharp cutoff UHF pentode.	7BD	7-pin Min.	1¾	¾	Htr.	6.3	0.15	—	250	100	0.5	0.1	Class A Amp. Mixer	250 250	100 100	−3 −5	2 G_c = 550 µmhos	.7	—	—	> 1 meg. Peak Osc. Volts = 4	—	— —	— —	**9001**
9002	UHF triode for use up to 500 Mc. Electrically similar to type 955.	7BS	7-pin Min.	1¾	¾	Htr.	6.3	0.15	500	250	—	1.6	—	Class A Amp.	90 250	— —	2.5 6.3	— —	— —	— —	1700 2200	14700 11400	25 25	— --	— —	**9002**
9003	UHF pentode amplifier electrically similar to type 956.	7BD	7-pin Min.	1¾	¾	Htr.	6.3	0.15	—	250	—	1.7	0.3	Class A Amp. Mixer	250 250	100 100	−3 −10	6.7 G_c = 600 µmhos	2.7		1800	700000 Osc. Peak Volts = 4	—	—	— —	**9003**

▲Explanation of abbreviations in APPLICATION column:
CTF — Class C Telegraphy and FM Modulated
CP — Class C Plate Modulated Amplifier (100% Modulation)
CT — Class C Telegraphy Power Amplifier and Oscillator
CM — Frequency Multiplier
CBT — Class B Television

‡Typical operation for two tubes.
†Referred to grid terminal.
*Includes grid flange.

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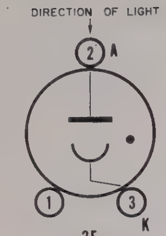
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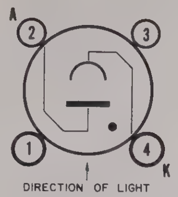
2F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DIRECTION OF LIGHT

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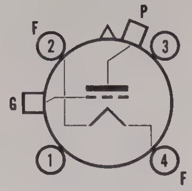

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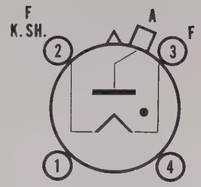
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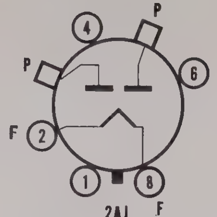

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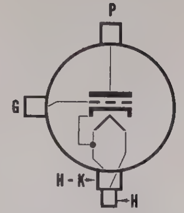

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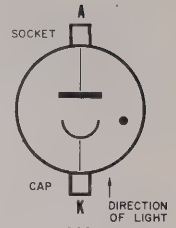
SOCKET
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CAP
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DIRECTION OF LIGHT

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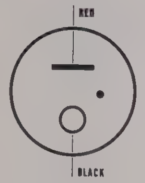

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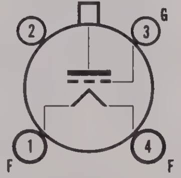

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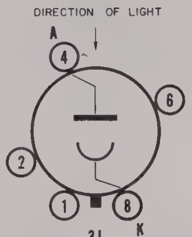
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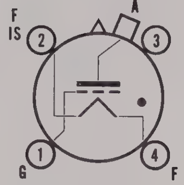
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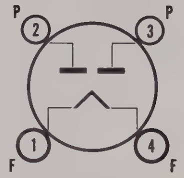

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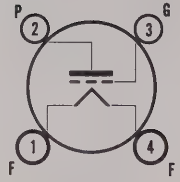

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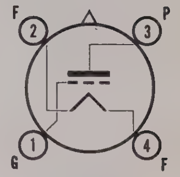

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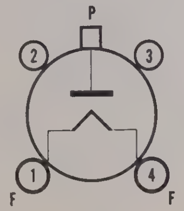

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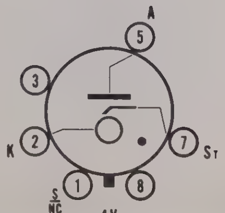
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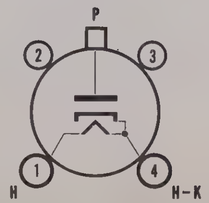

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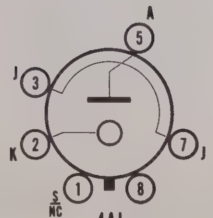
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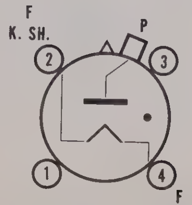
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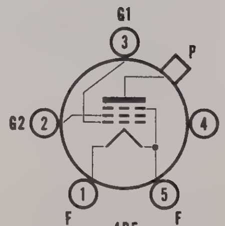
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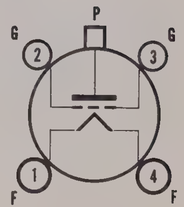

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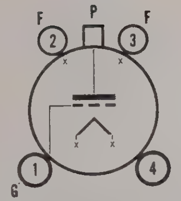

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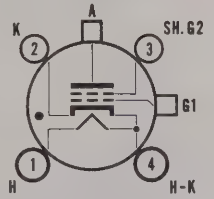
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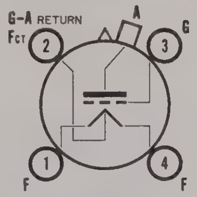
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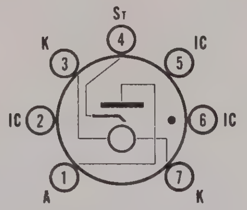
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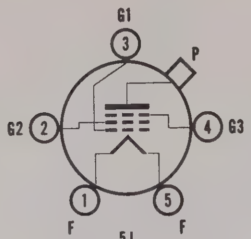
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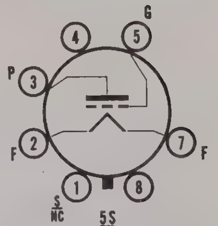
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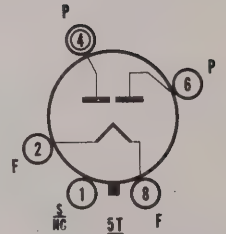
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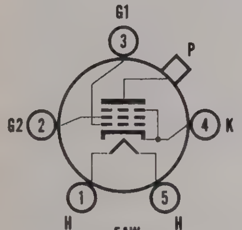
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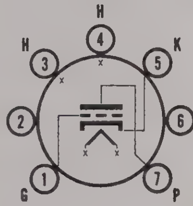
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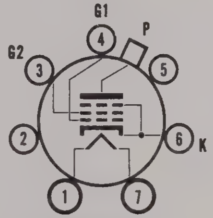
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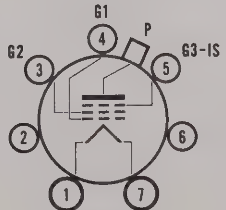
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7
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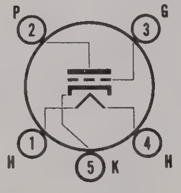
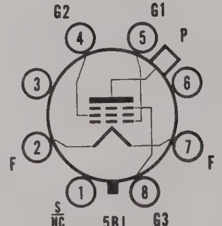
F

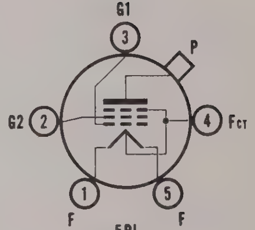
5BA


P
2
G
3
1
H
4
H
5
K

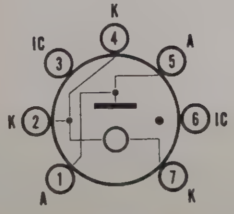
5BC


G2
4
G1
5
P
3
6
2
F
7
F
1
8
S
NC
G3

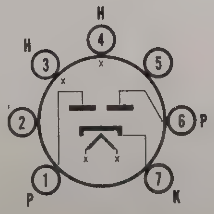
5BJ


G1
3
P
G2
2
4
FCT
1
F
5
F

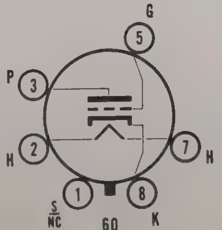
5BL


K
4
IC
3
A
5
K
2
6
IC
1
A
7
K

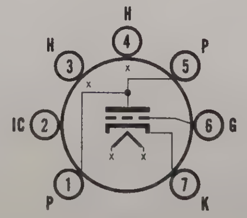
5BO


H
4
H
3
5
2
6
P
1
P
7
K

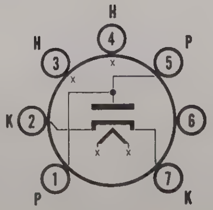
5BS


G
5
P
3
H
2
7
H
1
8
S
NC
K

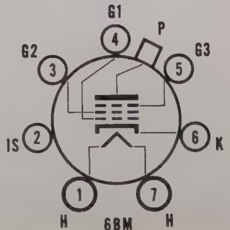
6Q


H
4
H
3
P
5
IC
2
6
G
1
P
7
K

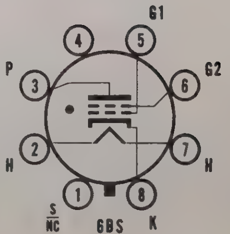
6BG


H
4
H
3
P
5
K
2
6
1
P
7
K

6BH

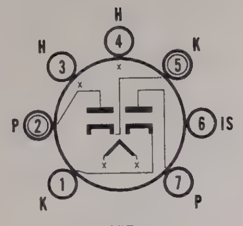

G1
4
P
G2
3
G3
5
IS
2
6
K
1
7
H
H

6BM

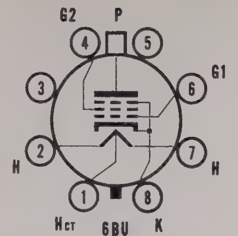

G1
5
4
P
3
6
G2
2
H
7
H
1
8
S
NC
K

6BS

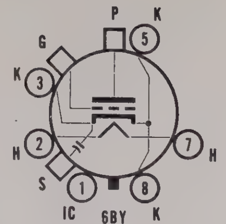
BASING DIAGRAMS FOR SPECIAL PURPOSE TUBE REFERENCE GUIDE



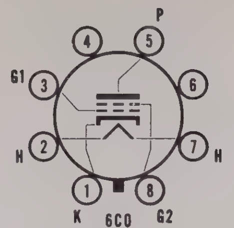
6BT


G2
P
G1
H
H
Hct
K

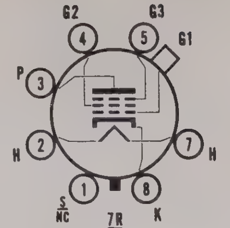
6BU


P
K
G
K
H
H
S
IC
K

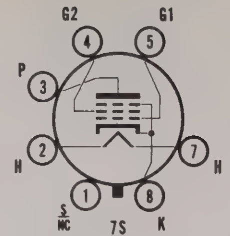
6BY



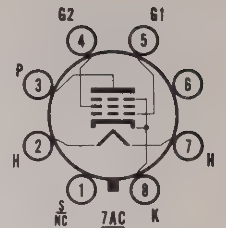
6CO


G2
G3
G1
P
H
H
S
NC
K

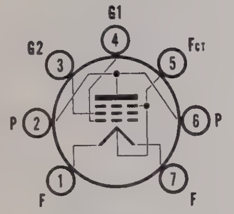
7R


G2
G1
P
H
H
S
NC
K

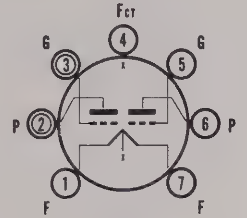
7S


G2
G1
P
H
H
S
NC
K

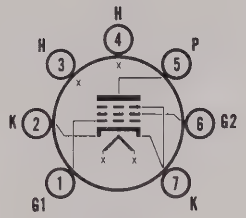
7AC


G1
G2
Fct
P
P
F
F

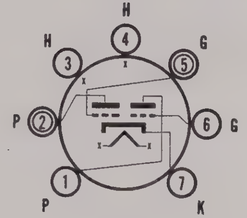
7BB



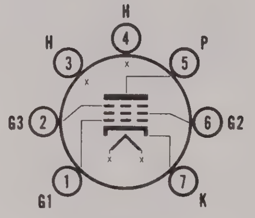
7BC



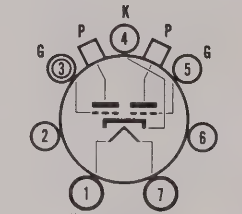
7BD



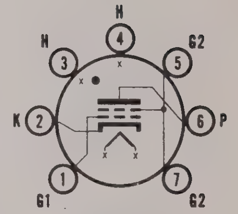
7BF


H
H
P
G3
G2
G1
K

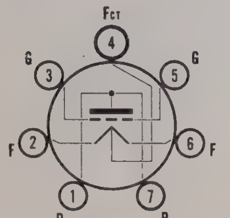
7BK



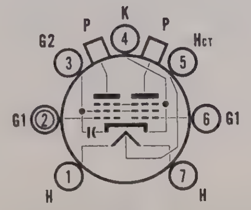
7BL


H
H
G2
K
P
G1
G2

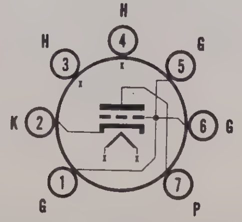
7BN



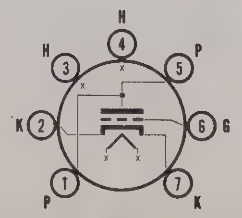
7BO


P
K
P
G2
Hct
G1
G1
H
H

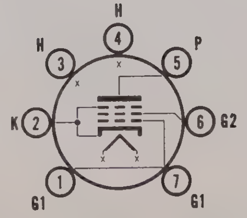
7BP



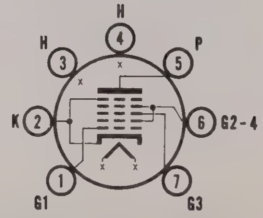
7BQ



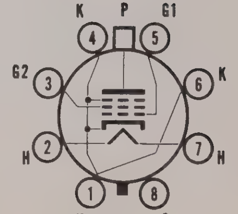
7BS


H
H
P
K
G2
G1
G1

7BZ


H
H
P
K
G2-4
G1
G3

7CH


K
P
G1
G2
K
H
H
K
S

7CK

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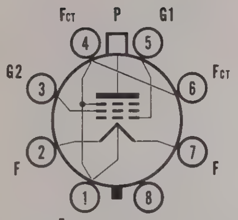
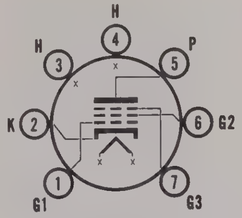
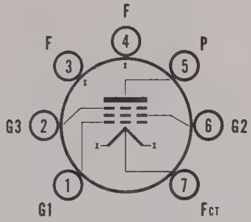

P
4 Fct
5 G1
3 G2
6 Fct
2 F
7 F
1 Fct
8

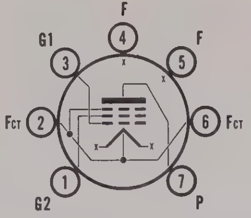
7CL


4 H
3 H
5 P
2 K
6 G2
1 G1
7 G3

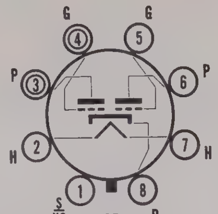
7CM


4 F
3 F
5 P
2 G3
6 G2
1 G1
7 Fct

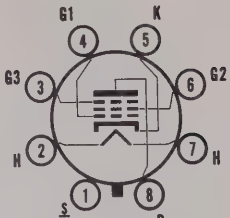
7CQ


4 F
3 G1
5 F
2 Fct
6 Fct
1 G2
7 P

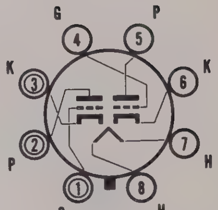
7CY


4 G
5 G
3 P
6 P
2 H
7 H
1 S/NC
8 P

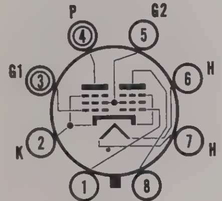
8B


4 G1
5 K
3 G3
6 G2
2 H
7 H
1 S/NC
8 P

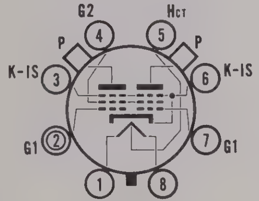
8N


4 G
5 P
3 K
6 K
2 P
7 H
1 G
8 H

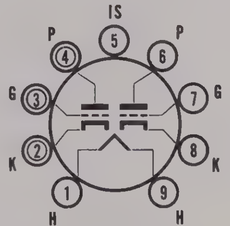
8BD


4 P
5 G2
3 G1
6 H
2 K
7 H
1 G1
8 P

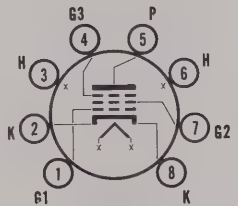
8BU


4 G2
5 Hct
P
P
3 K-IS
6 K-IS
2 G1
7 G1
1 H
8 H

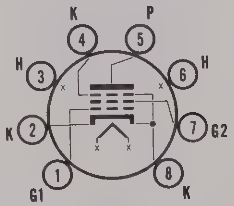
8BY


5 IS
4 P
6 P
3 G
7 G
2 K
8 K
1 H
9 H

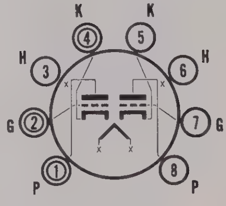
8CJ


4 G3
5 P
3 H
6 H
2 K
7 G2
1 G1
8 K

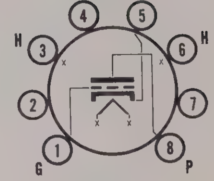
8DC


4 K
5 P
3 H
6 H
2 K
7 G2
1 G1
8 K

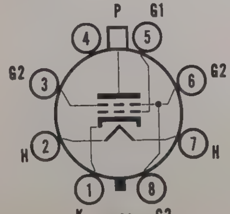
8DE


4 K
5 K
3 H
6 H
2 G
7 G
1 P
8 P

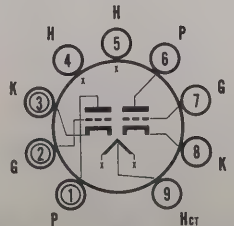
8DG


4
5 K
3 H
6 H
2
7
1 G
8 P

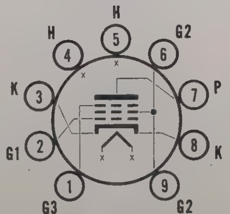
8DK


P
5 G1
4
3 G2
6 G2
2 H
7 H
1 K
8 G2

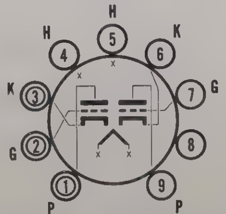
8GL


5 H
4 H
6 P
3 K
7 G
2 G
8 K
1 P
9 Hct

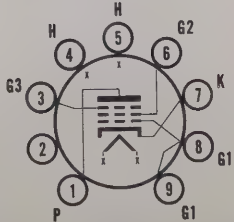
9A


5 H
4 H
6 G2
3 K
7 P
2 G1
8 K
1 G3
9 G2

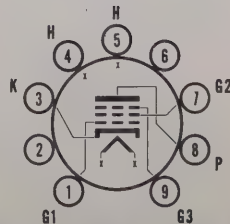
9G


5 H
4 H
6 K
3 K
7 G
2 G
8
1 P
9 P

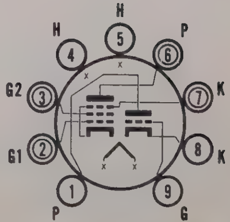
9H


5 H
4 H
6 G2
3 G3
7 K
2
8 G1
1 P
9 G1

9K

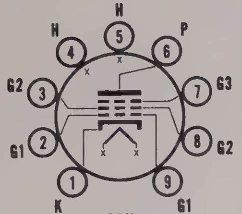

5 H
4 H
6
3 K
7 G2
2
8 P
1 G1
9 G3

9AD

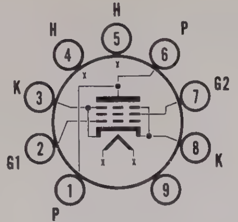

5 H
4 H
6 P
3 G2
7 K
2 G1
8 K
1 P
9 G

9AE

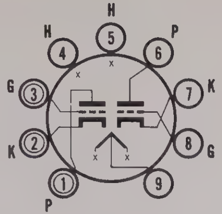
BASING DIAGRAMS FOR SPECIAL PURPOSE TUBE REFERENCE GUIDE


H
H
P
G2
G3
G1
G2
K
G1
1
2
3
4
5
6
7
8
9

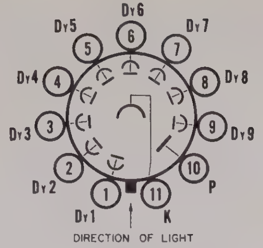
9BV


H
H
P
K
G2
G1
K
P
1
2
3
4
5
6
7
8
9

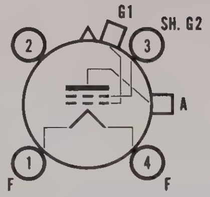
9CE


H
H
P
G
K
K
G
P
1
2
3
4
5
6
7
8
9

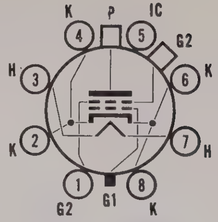
9CZ


Dy6
Dy5
Dy7
Dy4
Dy8
Dy3
Dy9
Dy2
P
Dy1
K
1
2
3
4
5
6
7
8
9
10
11
DIRECTION OF LIGHT

11K


G1
SH. G2
A
F
F
1
2
3
4

FG-97


K
P
IC
G2
H
K
K
H
G2
G1
K
1
2
3
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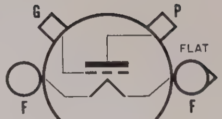

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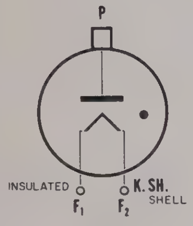
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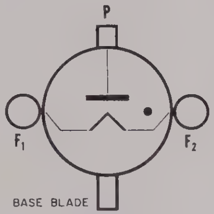
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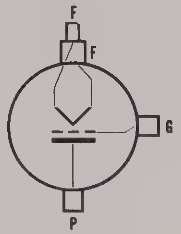

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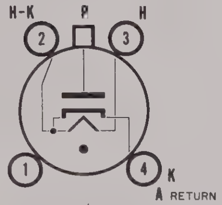
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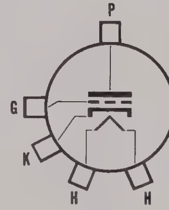

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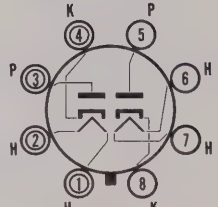
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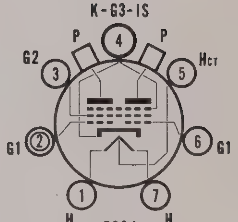
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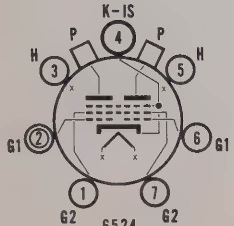
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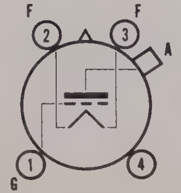

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APPENDIX

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GLOSSARY

VACUUM TUBES

A vacuum tube is a device consisting of an evacuated enclosure containing electrodes between which conduction of electrons through the vacuum or contained gas may take place.

Cathode-Ray Oscillograph Tube The cathode-ray oscillograph tube is a vacuum tube in which the electron beam strikes a fluorescent screen. The beam is deflected by applied electric and/or magnetic fields indicating the instantaneous values of the actuating voltage and/or current.

Gas Tube A vacuum tube in which the pressure of the contained gas or vapor is such as to effect substantially the electrical characteristics of the tube.

Hard Tube A vacuum tube with a near perfect vacuum. Tubes with some gas are called soft tubes.

High Vacuum Tube A vacuum tube which is evacuated to a high degree so that its electrical characteristics are essentially unaffected by gaseous ionization.

Mercury Vapor Tube A gas tube in which mercury vapor is the active contained gas.

Phototube An electron tube that is capable of converting light energy into electrical energy. Radiant energy striking a specially prepared surface inside the tube develops an electric current.

Thermionic Tube A vacuum tube in which one of the electrodes is heated to cause electron or ion emission from that electrode.

CLASSIFICATION BY NUMBER OF ELEMENTS

Diode A two-electrode vacuum tube containing an anode (plate) and a cathode.

Heptode A seven-electrode vacuum tube containing an anode, a cathode, a control electrode, and four additional electrodes ordinarily in the form of grids.

Hexode A six-electrode vacuum tube containing an anode, cathode, a control electrode, and three additional electrodes ordinarily in the form of grids.

Multipurpose Tubes A vacuum tube containing within one envelope two or more groups of electrodes associated with independent electron streams.

Octode An eight-electrode vacuum tube containing an anode, a cathode, a control electrode and five additional electrodes ordinarily in the form of grids.

Pentode A five-electrode vacuum tube containing an anode, a cathode, a control electrode, and two additional electrodes ordinarily in the form of grids called the screen and suppressor in receiving tubes.

Tetrode A four-electrode vacuum tube containing an anode, a cathode, a control electrode, and one additional electrode ordinarily in the nature of a grid.

Triode A three-electrode vacuum tube containing an anode, a cathode, and a control electrode.

ELECTRODE CLASSIFICATION

Anode The anode is usually called the plate in radio receiving tubes, and collector or ultor in cathode-ray tubes. It is the electrode to which the principal electron stream flows.

Grid An electrode that influences or controls the electron stream but is not designed principally to emit or collect electrons. It generally consists of a wire mesh in receiving tubes and concentric cylinders in cathode-ray tubes.

CATHODES, FILAMENTS AND HEATERS

Cathode Primary source of electron emission. Two main types—directly and indirectly heated.

Directly Heated or Filament Type Cathode An incandescent filament which is a source of direct emission.

Indirectly Heated or Heater Type Cathode Supplies heat to the surrounding cathode which then emits electrons.

Voltage and Current Tube design permits a slight variation but best results follow when rated values are applied. Low voltage causes reduced emission; excessive voltage shortens tube life.

Peak Heater-Cathode Voltage Highest instantaneous voltage a tube can withstand between heater and cathode.

Warm-Up Time See explanation of warm-up time in SERIES STRING HEATERS Section of APPENDIX.

FUNDAMENTAL VACUUM TUBE PROPERTIES

Amplification factor (μ), the dynamic resistance (r_p), and transconductance (g_m) are expressions of the principal dynamic operating characteristics of a vacuum tube. Quantitative calculations may be carried out using these factors of tube performance. These properties being dependent upon one another are related as follows:

$$\mu = r_p \text{ multiplied by } g_m$$

Amplification Factor The ratio of a small change in plate voltage to a corresponding change in grid voltage under the conditions that the plate current and all other electrode voltages remain constant.

Dynamic Plate Resistance The ratio of a small change in plate voltage to a corresponding small change in plate current produced, with grid voltage held to a constant value. It represents the resistance between the cathode and the plate to alternating current.

Transconductance The ratio or change in plate current with respect to a change in grid voltage when the other voltages are held constant is called transconductance or mutual conductance. The unit of transconductance is the mho (ohm spelled backward) but as this is a large unit to use in vacuum tube applications, the one-millionth part of a mho, or micromho, is generally used.

AMPLIFIER CLASSIFICATIONS

Class A Amplifier One in which the grid bias and alternating voltages are such that plate current in the tube, or in each tube of a push-pull stage, flows at all times. This is accomplished by operating at the center point of the plate current versus grid voltage curve, and using signal voltages which do not drive the grid into either the positive region or into the sharp bend near cutoff voltage.

Class AB Amplifier One in which the grid bias and alternating voltages are such that plate current in a given tube flows for appreciably more than half but less than the entire cycle.

Class B Amplifier One in which the grid bias is approximately equal to the cutoff value so that plate current is approximately zero when no exciting grid voltage is applied. Plate current flows for approximately one-half of each cycle when an alternating grid voltage is applied. It is used for both audio and radio frequency amplifiers, usually in push-pull to minimize distortion.

Class C Amplifier One in which the tube operates at a bias much greater than cutoff so that plate power is drawn for appreciably less than one-half of each cycle. It is not used for audio amplifiers since the distortion is too high but it is the most efficient class of operation for r-f amplifiers where harmonics can be reduced by use of resonant circuits.

GENERAL SYMBOLS

A	ampere (a-c rms or d-c)
mA	milliampere
μA	microampere
a-c	alternating current
AQL	acceptable quality level
cps	cycles per second
kc	kilocycles per second
mc	megacycles per second
°C	degrees centigrade
CRO	cathode-ray oscilloscope
db	decibel
d-c	direct current
Δ	a change in value of the indicated variable
rms	root-mean-square (.707 times the peak value)
V	volt (a-c rms or d-c)
mV	millivolt
μV	microvolt
W	watt
mW	milliwatt
NF	noise figure
P	total power dissipation
R_L	load resistance
T	temperature
T_A	ambient temperature
T_j	junction temperature
T_{stg}	storage temperature
f	farad
μf	microfarad

RECEIVING TUBE SYMBOLS

e_c	instantaneous total grid voltage
e_b	instantaneous total plate voltage
i_c	instantaneous total grid current
i_b	instantaneous total plate current
E_c	average or quiescent value of grid voltage
E_b	average or quiescent value of plate voltage
I_c	average or quiescent value of grid current
I_b	average or quiescent value of plate current
e_g	instantaneous value of varying component of grid voltage
i_p	instantaneous value of varying component of plate current
E_g	effective or maximum value of varying component of grid voltage
E_p	effective or maximum value of varying component of plate voltage
I_g	effective or maximum value of varying component of grid current
I_p	effective or maximum value of varying component of plate current
E_f	filament or heater terminal voltage

RECEIVING TUBE SYMBOLS (cont.)

r_p	plate resistance
g_{jk}	transconductance from electrode k to electrode j
g_m	grid-plate transconductance (mutual conductance)
μ	amplification factor
C_{gp}	grid-plate capacitance
C_{gk}	grid-cathode capacitance
C_{pk}	plate-cathode capacitance
C_{gh}	grid-heater capacitance
C_{ph}	plate-heater capacitance
C_g	grid capacitance
C_p	plate capacitance
C_k	cathode capacitance
E_{inv}	peak (or crest) inverse voltage
E_{fwd}	peak (or crest) forward voltage
t_k	cathode heating time
P_o	power output
P_i	power input
P_p	anode dissipation

SEMICONDUCTOR SYMBOLS

Diodes

E_b	d-c voltage across the diode
E_{bb}	d-c supply voltage
E_p	a-c voltage across the diode
E_{pp}	a-c rms supply voltage
I_b	d-c current through the diode in the forward direction
LI_b	d-c current through the diode in the reverse direction
I_o	rectified d-c current through the diode
i_L	peak load current
t_r	rise time

Transistors

Transistor Basic Symbols

		i, v, p	I, V, P
SUBSCRIPTS	e b c	Instantaneous Varying Components Value	RMS or Effective Varying Components Value
	E B C	Instantaneous Total Value	Average (DC) Value

I_{CBO}, I_{CEO}	The collector current when the collector (1st subscript) is biased in the reverse direction with respect to the reference electrode (2nd subscript) and the other electrode is d-c open-circuited (3rd subscript) to the reference electrode.
I_{EBO}, I_{ECO}	The emitter current when the emitter is biased in the reverse (high resistance) direction with respect to the reference electrode and the other electrode(s) is d-c open circuited (to the reference electrode).

SEMICONDUCTOR SYMBOLS (cont.)

I_{CBS}, I_{CES}	The collector current when the collector (1st subscript) is biased in the reverse direction with respect to the reference electrode (2nd subscript) and the other electrode is d-c short-circuited (3rd subscript) to the reference electrode.
I_{EBS}, I_{ECS}	The emitter current when the emitter is biased in the reverse (high resistance) direction with respect to the reference electrode and the other electrode(s) is d-c short-circuited (to the reference electrode).
I_{BCS}, I_{BES}	The base current when the base is biased in the reverse (high resistance) direction with respect to the reference electrode and the other electrode(s) is d-c short-circuited (to the reference electrode).
C_{oc}, C_{ob}, C_{oe}	The capacitance measured across the output terminals (1st subscript) with the input a-c open-circuited. The reference or common electrode is indicated by the 2nd subscript.
$f_{\alpha e}$, $f_{\alpha b}$, $f_{\alpha c}$	Alpha cutoff—The frequency at which the magnitude of the small-signal short-circuited forward current transfer ratio (α) is 0.707 of the low-frequency value. The reference or common electrode is indicated by the 2nd subscript.
(α)	emitter input current gain.
B	large signal base input current gain
(β)	small signal base input current gain
PG	$\text{Power Gain} = \dfrac{\text{Power Output}}{\text{Available Input Power}}$
r_b	internal base resistance (dynamic)

INTERPRETATION OF ELECTRON TUBE RATINGS AND CHARACTERISTICS

RATING SYSTEMS FOR VACUUM TUBES

Design-Center Rating System Design-Center ratings are limiting values expressed with respect to an average tube of a specified type for use in a specific service and should not be exceeded under normal operating conditions.

These values are chosen by the tube manufacturer to provide acceptable tube life and satisfactory performance in the average application for tubes of the specified type and for normal variations of supply voltage and components used for the specified service. The tube manufacturer, therefore, must rate the tube type so that initially and throughout life, with normal supply voltage variations of ±10% and normal equipment variations, the tube of the specified type, on the average, will provide satisfactory performance.

The equipment designer uses the design-center ratings as limiting values at which equipment may be designed with average (bogey) tubes and specified supply voltages.

Absolute Maximum Rating System The absolute-maximum ratings for each type are limiting values beyond which the serviceability of the tube may be impaired from viewpoint of life and satisfactory performance. The equipment designer must establish the circuit design so that initially and throughout tube and equipment life, no absolute-maximum value is exceeded under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions and variation in the tube characteristics.

Design Maximum Ratings Design Maximum Ratings are the limiting values expressed with respect to average (bogey) tubes at which satisfactory tube life can be expected to occur in the types of service for which the tube is rated. Therefore, the equipment designer must establish the circuit design so that initially and throughout equipment life no design maximum value is exceeded with an average tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, and environmental conditions.

Typical Operation For many receiving tubes, the data show typical operating conditions in particular service. Typical operating values are given to show concisely some guiding information for the use of each type. They are not to be considered as ratings because the tube can be used under any suitable conditions within its rating limitations.

Reference Points for Maximum Ratings All electrode voltages under these systems are measured relative to a fixed reference point which is defined as follows:

a. Cathode Types: The reference point is the cathode terminal.

b. D-C Filamentary Types: The negative filament terminal.

c. A-C Filamentary Types: The electrical center of the filament.

Reference Points For All Voltages Except Maximum Ratings These are measured relative to a fixed reference point which is defined as follows:

a. Cathode Types Not Rated with Cathode Bias: Cathode terminal.

b. Cathode Types With Cathode Bias: Negative terminal of the cathode-bias resistor.

c. D-C Filamentary Types: Negative filament terminal.

d. A-C Filamentary Types: Electrical center of the filament.

DIRECT INTERELECTRODE CAPACITANCES

The capacitance existing between the electrodes in a vacuum tube. When two conductors are separated by a dielectric, direct capacitance is equal to the charge produced divided by the voltages applied. Since the electrodes in an electron tube are conductors and they are separated by a dielectric (the vacuum), capacitance develops between them. Unless otherwise indicated, all capacitances are measured with filament or heater cold, with no direct voltages present, or no external shields. All electrodes are grounded other than those between which capacitance is being measured.

Input Capacitance Measured between the input electrode and all other electrodes except the output electrode. Ground the output electrode and inactive tube sections.

Output Capacitance Measured between the output electrode and all other electrodes except the input electrode. Ground input electrode and inactive sections.

ELECTRODE CONNECTIONS FOR MEASURING DIRECT INTERELECTRODE CAPACITANCES

(From RETMA ET-109A or ASA C60.6 1952)

CAPACITANCE	MEASURE BETWEEN	GROUND
Indirectly Heated Cathode Types		
Heater-Cathode	Heater and cathode	All other electrodes
Diode Types		
Input	Plate + cathode + fil. + shields, etc.	Other sections
Triode, Tetrode, Pentode Types		
Grid-Plate	Grid and plate (Cgp)	All other electrodes
Input	Grid and cathode + fil. + screen + shields, etc.	Plates, diodes, inactive section(s)
Output	Plate and cathode + fil. + screen + shields, etc.	Grids, diode, inactive section(s)
Input (Grounded Grid) (Receiving Tubes Only)	Cathode and grid + fil. + screen + shields, etc.	Plate, diodes, inactive section(s)
Output (Grounded Grid) (Receiving Tubes Only)	Plate and grid + fil. + screen + shields, etc.	Cathode, diode, inactive section(s)
Converter Types		
R-F Input	Signal grid and all other electrodes	....
Mixer Output	Mixer plate and all other electrodes	....
Oscillator Input	Oscillator grid and cathode + fil. + shields, etc.	Oscillator plate + other section(s)
Oscillator Output	Oscillator plate and cathode + fil. + shields, etc.	Oscillator grid + other section(s)

CLASS A AMPLIFIER RATINGS

Peak Heater-Cathode Voltage A maximum rating for the highest voltage that a tube can withstand between heater and cathode. The specified voltage may or may not distinguish between changing d-c voltages applied. The sum value, positive or negative, is designated as *Total D-C and Peak;* thus including both components. To guard against the more severe condition, the d-c component value is generally specified only with the heater positive with respect to cathode, for tubes used in ordinary applications often require appropriate heater-cathode voltage ratings.

Plate Dissipation The highest average value of power input to the plate at zero signal condition.

Screen Dissipation The highest average value of screen input. This usually coincides with the condition where the peak input voltage equals the bias voltage. See section entitled "Screen Grid Ratings and Rating Chart" for additional screen rating information.

RECTIFIER RATINGS

Peak Inverse Plate Voltage The highest instantaneous plate voltage that the tube can recurrently stand in the reverse direction to that of normal current flow.

Peak Plate Current The highest instantaneous plate current recurrently allowed for normal current flow.

D-C Output Current The highest average plate current that may be handled continuously.

Surge Plate Current The highest value of abnormal peak plate current of short duration under the most adverse conditions. For additional details see section entitled "Rectifier Ratings and Rating Charts."

TELEVISION TUBE RATINGS

Ratings for television scanning service are based on operation in a 525-line, 30-frame system as described in "Standards of Good Engineering Practice for Television Broadcast Stations; Federal Communications Commission" in which the duty cycle of the voltage pulse does not exceed 15% of one scanning cycle.

Horizontal deflection tube ratings are based on a voltage pulse width of 10 microseconds in horizontal deflection service to comply with the 15% duty cycle described above.

Vertical deflection tube ratings are based on a voltage pulse width of 2500 microseconds in vertical deflection service to comply with the 15% duty cycle described above.

HORIZONTAL DEFLECTION AMPLIFIER RATINGS

D-C Plate Voltage For all practical purposes, d-c plate voltage is expressed as the sum of the d-c power supply voltage and boost voltage. Actually, it is the d-c supply voltage plus the boost voltage minus the IR drop in the transformer and, in the case of direct-drive circuits, also less the drop in the damper diode.

Peak Positive Plate Voltage Based on actual voltage breakdown considerations at the frequency, duty cycle and supply impedances of the horizontal amplifier stages. It is an absolute maximum rating determined by the tube manufacturer.

Peak Negative Pulse Plate Voltage This rating is intended to protect the tube against failure caused by plate emission at the time the plate swings negative to cathode.

Peak Negative Grid 1 Voltage This rating has been established at —300 volts. It is not an absolute maximum value.

Plate Dissipation Maximum plate dissipation rating is determined on the same basis used to establish the plate dissipation rating for Class A Service. When the tube is used as a horizontal deflection amplifier, measurement of plate dissipation is difficult. Comparison methods are considered acceptable. Comparison methods are defined as those in which the temperature of the plate, or a factor which is a function of the temperature of the plate, is first measured operationally. Plate dissipation is then determined by the static power input to the plate necessary to duplicate the temperature, or other factors so measured, keeping other elements and ambient temperature at the operational value.

Grid 2 (Screen) Dissipation Determined on the same basis as for Class A service.

Average Cathode Current This rating is based on the same principle used to establish the maximum average cathode current for Class A service.

Peak Cathode Current This rating is 3.5 times the average cathode current. It is required by the application, and field experience has indicated that it is a safe and practical value.

Grid 1 Circuit Resistance The grid 1 circuit resistance has been established as 0.47 megohms for all horizontal deflection amplifiers. This value is based upon requirements of the application and limitations of the tube with respect to gas and grid emission.

Average Characteristics Average characteristics are chosen so that interchangeability among tubes of different manufacture would be increased. Static characteristics are described whose factors define the pertinent characteristics of the horizontal deflection tube.

Additional characteristics to define the tube's operation without the use of characteristics curves are included. They are the plate and screen currents in the region of the knee of the plate characteristics, and the triode connected amplification factor.

The knee-region characteristic is a zero-bias test point at a position 10 to 20 volts above the plate voltage which corresponds to the knee of the plate-family characteristic curve. Instantaneous values are indicated to protect the tube when the values described exceed the maximum permissible plate and screen dissipation.

VERTICAL DEFLECTION AMPLIFIER RATINGS

D-C Plate Voltage Determined on the same basis used to establish the maximum d-c plate voltage rating for Class A service.

Peak Positive Pulse Plate Voltage Based on actual voltage breakdown, considerations of the typical duty cycle and supply impedances of the vertical amplifier stages. This is an absolute maximum rating.

Peak Negative Pulse Grid 1 Voltage As a practical expedient, a value of 250 volts is assigned with due weight taken into consideration for vertical deflection application.

Plate Dissipation Determined on the same basis as used for establishing plate dissipation ratings for Class A service. Refer to the discussion of maximum plate dissipation under horizontal deflection amplifiers.

Average Cathode Current Based on the same considerations as those used to establish the maximum average cathode current for Class A service.

Peak Cathode Current At 60 cycles and a maximum duty cycle of 15%, the peak cathode current is 3.5 times the average cathode current. Based on application requirements with due regard for the limitations of the cathode at the duty cycle repetition rate encountered in this service.

Grid 1 Circuit Resistance Maximum grid 1 circuit resistance rating is based on the requirements of the application and the limitations of the tube with respect to gas and grid emission and has been established at 2.2 megohms.

HORIZONTAL AND VERTICAL DEFLECTION OSCILLATOR RATINGS

D-C Plate Voltage Based on the same considerations used to establish the maximum d-c plate voltage rating for Class A service.

Peak Negative Pulse Grid 1 Voltage Since grid-cathode leakage could become a limiting factor in this rating before the breakdown capabilities of the tube are reached, it was decided to use the value of 250 volts with due weight being given to the application requirements.

Peak Cathode Current This rating is a multiple of the average cathode current based on application requirements with due consideration given to cathode capabilities, the typical duty cycle, and repetition rate encountered in this service. A multiplying factor of 3.5 at 60 cycles and a maximum duty cycle of 15% is used for vertical oscillators. A multiplying factor of 15.0 at 15,750 cycles and a maximum duty cycle of 15% is used for horizontal oscillators.

Grid 1 Circuit Resistance The value of grid 1 circuit resistance is based upon the requirements of the application and limitations of the tube with respect to gas and grid emission. It has been established at 2.2 megohms.

DAMPER RATINGS

Peak Inverse Plate Voltage Rating Based on actual voltage breakdown at typical duty cycle frequencies and supply impedances encountered in the horizontal deflection circuit. It is an absolute maximum value.

Heater-Cathode Voltage When the heater is operated negative to the cathode, damping diodes can withstand high voltages between heater and cathode. Values given under heater negative to cathode include the d-c component and the total d-c peak values based on actual breakdown considerations.

Heater Positive to Cathode Permissible heater-cathode voltage compares in magnitude to that found in other types.

D-C Plate Current Based on capabilities of the cathode.

Peak Plate Current Based on cathode capabilities for this service.

Plate Dissipation Rating Based on the physical limitations of the tube. It is determined in application by comparison methods described under maximum plate dissipation rating for horizontal deflection amplifiers.

NOTE: All rectifier ratings are not given for damping diodes. The high plate supply impedance required to limit the steady state peak plate current and the plate dissipation to rated values makes such usage impractical.

SERIES-STRING HEATERS

Series-string heater circuits are used in television receivers to eliminate the need for a heater power transformer, thus reducing weight and cost. The use of heater-cathode type tubes having heater warm-up control characteristics in series-string circuits reduces voltage surges across the heaters during the warm-up period. As a result tube life is extended and heater burn-outs are reduced.

Heater voltage surges are a result of the change in heater resistance from a cold to hot condition. If the manufacturing process for tubes is controlled so that all the tubes used in a series-string have resistance values that increase at approximately the same rate, then the voltage across the tubes will remain equalized. If the heaters were uncontrolled, then the fastest warming-up tubes would have higher than normal voltage across them and the slower warming-up tubes would have lower than normal voltage across them.

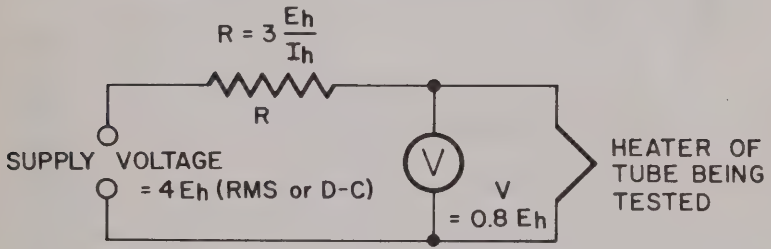
By imposing close tolerances during manufacture on the heater currents. the operating voltage of each tube in the series-string will be held close to its rated value. That is, the resistance of the heater will be such that the correct voltage drop results when the specified current is applied.

The difference in voltage between that of the power line and the sum of the heater voltages is dropped by a voltage dropping resistor of suitable resistance and wattage.

To allow flexibility of design and to reduce to a minimum the voltage dropping resistance, several heater currents are available for warm-up controlled series-string circuits. Values of current now used are the 600 ma., 450 ma., and the 300 ma. current types.

Heater Warm-Up Test The warm-up time of the individual tubes is established by the heater warm-up-time test which has been standardized throughout the industry. In the test, the measured time is that required for the heater to reach 80% of its rated heater voltage during warm-up from room temperature with 4 times the rated heater voltage applied in series with a fixed resistor. This resistor is specified to be 3 times the hot resistance of the tube's heater. For a tube to meet the warm-up specification, the time measured should be approximately 11 seconds. The test circuit used with its formulae is shown below.

WARM-UP TIME TEST CIRCUIT



E_h = RATED HEATER VOLTAGE I_h = RATED HEATER CURRENT

NOTE: Heater warm-up time is the time for the voltage (V) to reach 80% of the rated heater voltage (Eh) in the test circuit shown.

RECTIFIERS, RATINGS, AND RATING CHARTS

Ratings of rectifier tubes are based upon fundamental limitations in the operation of tubes. In general, the limitations are inverse plate voltage, transient-peak plate current, steady-state peak plate current, d-c output current, and heater-cathode voltage for types with indirectly-heated cathodes. Maximum ratings for such parameters are included in the tube data. The various maximum ratings are generally not obtainable simultaneously.

Proper tube operation requires that the operating characteristics satisfy the conditions of Rating Charts I, II, and III, with a capacitor-input circuit. With a choke input circuit filter, the operating characteristics must satisfy the conditions of Rating Chart I.

Rating Chart I Use Rating Chart I to determine proper values of a-c plate supply voltage and d-c output current. The operating point must be within the proper area for the type of filter used. Use Rating Chart I first to find the coordinate point for the a-c supply voltage (RMS) per plate and the d-c output current that are to be used. The point should fall within the area indicated on the chart for the type of filter input being employed.

Should the point fall outside the permissible area of operation, either the a-c supply voltage or d-c output current must be lowered to provide operation within the tube's maximum ratings.

RECTIFIER RATING CHART I

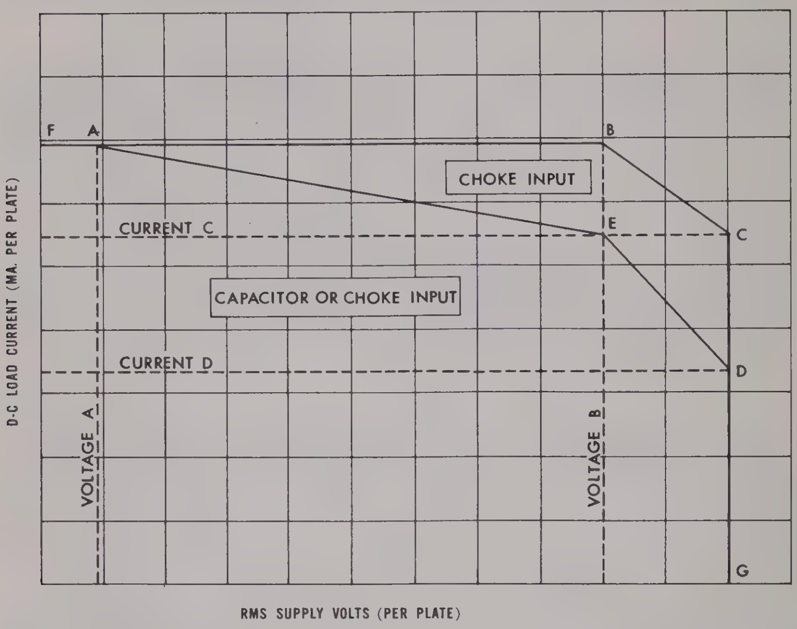


TABLE FOR RATING CHART I

Data Used in Defining the Area of Operation for Popular Rectifier Tubes

TYPE	A	B	C	D	E	F	G
5AS4	61 volts	450 volts	137.5 ma	87 ma	137.5 ma	174 ma	550 volts
5AW4	48 volts	450 volts	125 ma	75 ma	125 ma	150 ma	550 volts
5U4G	60 volts	450 volts	113 ma	71 ma	113 ma	143 ma	550 volts
5U4GA	58 volts	450 volts	125 ma	80 ma	125 ma	158 ma	550 volts
5U4GB	61 volts	450 volts	137.5 ma	87 ma	137.5 ma	174 ma	550 volts
5Y3GT	62 volts	350 volts	62.5 ma	39.5 ma	62.5 ma	80 ma	500 volts
6X4	26 volts	325 volts	35 ma	22 ma	35 ma	42 ma	450 volts

Rating Chart II Rating Chart II determines the operating point within the maximum steady-state peak plate current rating. The maximum permissible rectification efficiency is shown as a function of the d-c output current.

Rectification efficiency, η, is determined by the formula

$$\eta = \frac{\bar{E}}{2\ E_s},$$

where E is the d-c output voltage at the filter input and E_s is RMS supply voltage per plate. With the measured value of the d-c current and the calculated value of rectification efficiency, the operating point can be found on Rating Chart II. This point must lie within the shaded area under the curve for operation within the maximum steady-state peak plate current rating. If it does not lie within that area, a circuit adjustment must be made. Usually, the rectification efficiency can be lowered either by reducing the value of the filter input capacitor or by increasing the total supply resistance per plate. It is preferable to adjust the latter. This supply resistance can be built into the transformer winding.

RECTIFIER RATING CHART II

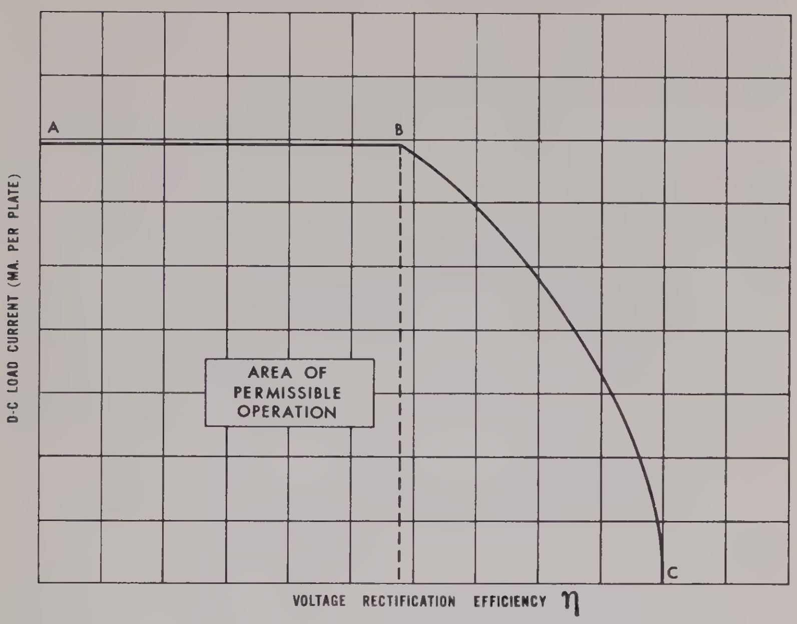


TABLE FOR RATING CHART II

Data Used in Defining the Area of Permissible Operation for Popular Rectifier Tubes

TYPE	A	B	C
5AS4	174 ma	0.6	1.0%
5AW4	150 ma	0.5	1.0%
5U4G	143 ma	0.55	1.0%
5U4GA	158 ma	0.6	1.0%
5U4GB	175 ma	0.58	1.0%
5Y3GT	80 ma	0.55	1.0%
6X4	42 ma	0.52	1.0%

Rating Chart III Rating Chart III is used to determine whether the tube operation is within its maximum transient peak plate-current rating. The transient peak plate-current is also called the hot-switching current.

The hot-switching current is the transient current that flows when the equipment is switched on again before the temperature of the cathode has decreased appreciably. This transient current will be large if the filter capacitor is in a discharged state when the supply voltage is reapplied. The largest possible transient current flows when the supply voltage is at its peak at the instant equipment is switched on.

The hot-switching current is limited only by the resistance of the tube and the associated circuit. Therefore, sufficient resistance must be present to keep the transient current below the rated maximum value. Insufficient resistance may cause a flow of excessive current that can destroy the rectifier. To determine whether the hot-switching current is below the maximum rating, the total effect of series plate-supply resistance per plate must first be calculated. This resistance is given by the formula:

$$R_s = R_{sec} + N^2 R_{pri} + R_a$$

where R_{sec} is the d-c resistance of the transformer secondary per section, R_{pri} is the d-c resistance of the transformer primary, R_a is the d-c resistance of added series-resistance per plate, and N is the voltage step-up ratio of the transformer per section.

After calculating this resistance, the minimum permissible value of series plate-supply resistance per plate should be determined from Rating Chart III for the particular a-c supply voltage to be used. For safe operation the calculated value of resistance must be equal to or greater than the resistance found in the chart.

If the calculated resistance is less than the minimum resistance value as shown in Rating Chart III, resistance must be added in series with each diode plate so that the calculated resistance will be equal to or greater than the minimum permissible resistance. Series inductance may also be used to limit the transient-peak plate current. If series inductance is used, the resistance R_s in the above formula can be lower than the minimum value indicated by the chart, but the combined effect must limit the transient current to a value below the maximum rating. In the case of combination inductance and resistance, the proper value of series resistance must be experimentally determined.

The series plate-supply resistance limits both the transient-peak plate current and the steady-state peak plate current. The minimum value required to limit each current will not be the same, however, and the larger value of resistance should be chosen.

RECTIFIER RATING CHART III

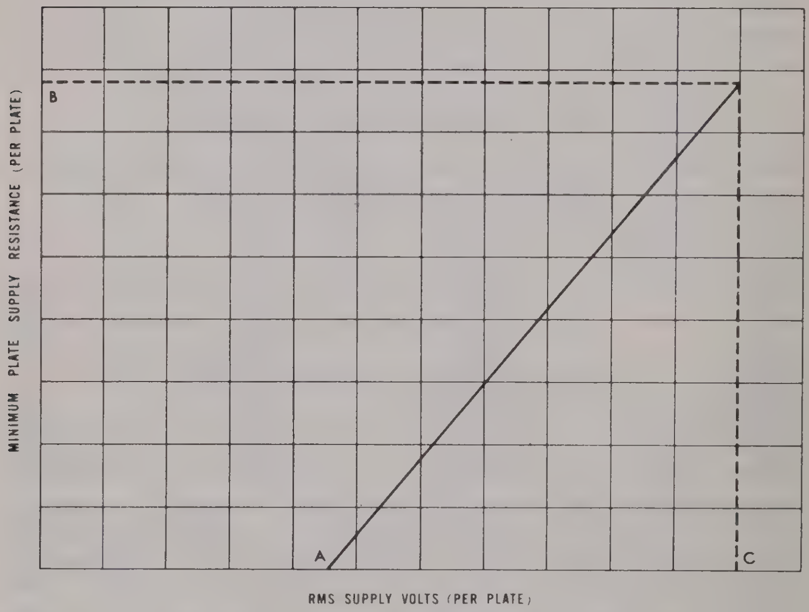


TABLE FOR RATING CHART III

Data Used in Defining the Minimum Effective Plate Supply Resistance for Popular Rectifier Tubes

TYPE	A	B	C
5AS4	232 volts	98 ohms	550 volts
5AW4	200 volts	184 ohms	775 volts
5U4G	210 volts	130 ohms	575 volts
5U4GA	223 volts	108 ohms	550 volts
5U4GB	230 volts	98 ohms	550 volts
5Y3GT	262 volts	160 ohms	550 volts
6X4	98 volts	500 ohms	450 volts

NOTE: If individual Rating Charts for each tube are desired, they are published in the CBS Tube Handbook Engineers' Edition.

SCREEN GRID RATINGS AND RATING CHARTS

Screen grid voltage for a tube may be obtained from either a fixed supply or through a screen dropping resistor. A voltage source is considered fixed if there is no significant voltage change with current variation.

Tube data may show a maximum screen voltage or maximum screen supply voltage. When maximum screen voltage is shown, the voltage measured at the screen terminal should not exceed such value under any circuit operating condition. When maximum screen supply voltage is shown, the screen voltage may be permitted to reach the rated supply voltage providing that the screen dissipation is held within the limits shown in Chart A. Screen dissipation is the screen voltage multiplied by the screen current.

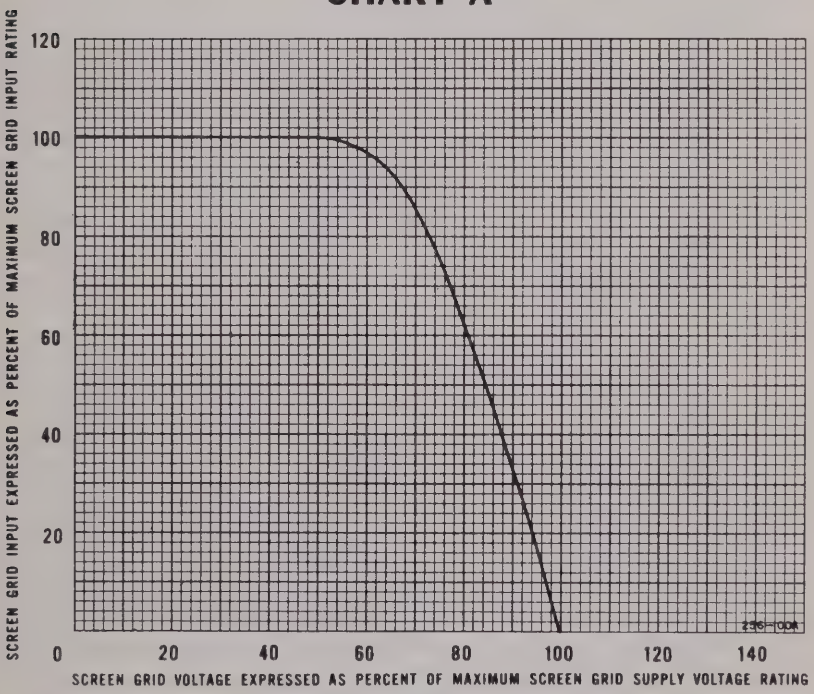
The chart is of universal use in circuits for either fixed screen voltage or a series screen-dropping-resistor. It represents the maximum permissible screen dissipation as a percentage of maximum screen-dissipation rating at any screen-voltage operating point. Full rated screen dissipation is permissible from zero up to 50 percent of the maximum-rated screen-supply voltage. From that point on the allowable dissipation decreases.

Fixed screen dissipation should be within the boundary of the chart at the screen voltage to be used.

A screen-grid dropping resistor should limit the current so that the dissipation is within the same boundary of the chart. The minimum value of voltage dropping resistor is given by the factor $\frac{E_{cc2}^2}{4P_{g2}}$ where E_{cc2} is the selected screen supply voltage and P_{g2} is the maximum screen dissipation for the type.

To illustrate, assume that a tube is rated at a maximum screen-supply voltage of 300 volts and 1.0 watt maximum screen dissipation. If it is desired to operate the tube at 200 volts, then 66-2/3 percent of the maximum screen supply voltage is supplied directly to the screen. From Chart A the allowable dissipation is 88 percent of the maximum dissipation, or 0.88 watts.

CHART A



If the tube is to operate with a screen dropping resistor, the maximum screen voltage must not exceed 300 volts in the example cited above; and the dropping resistor is selected to hold the dissipation within a safe margin of its rated maximum. The dropping resistor can be determined from the formula:

$$R_{c2} \geqq \frac{E_{cc2}^2}{4P_{g2}}$$

where R_{c2} is the screen dropping resistor in ohms, E_{cc2} is the selected screen voltage in volts, and P_{g2} is the maximum screen dissipation rating in watts. For example, if a screen supply voltage at 250 volts was selected for the above cited tube type, $R_{c2} \geqq \frac{250^2}{4 \times 1.0} = 15{,}625$ ohms.

EXPLANATION OF TUBE TYPE NUMBERING SYSTEM

Systems Tubes are identified by a combination of numbers and letters designed to describe basic characteristics such as heater voltage, generic type, and certain physical or constructional features. Many systems have been devised to facilitate identification but they have all failed because of the increasing number, variety, and complexity of present-day tubes. Today, there are three systems generally used for the majority of tubes.

System I: (for radio and television receiving tubes)

a. A number representing the rated filament or heater voltage. Companion types which are identical except for heater or filament voltage usually have the same designation except for this first number.

b. A letter or letters, assigned by RETMA, generally in alphabetical order.

c. A number which specifies (with some exceptions) useful elements for which terminals are provided. Type 6AQ5, for example, a beam pentode, has five useful elements. Shields, including the envelope of a metal tube, connected to its separate terminal (s) count as useful elements. An octal based glass tube having *n* useful elements, exclusive of those connected to Pin 1, is counted as having *n+1* useful elements. Terminals labeled "*IC*" or "*Internal Connection, Do Not Use*" do not count as useful elements. Combination of elements connected to one terminal count as one useful element.

d. A letter (s) which may designate the following characteristics: construction, size, or improved electrical rating. None or only part of these may be present. The letter "G" indicates a glass tube with octal base. The combination "GT" indicates the use of a T-9 glass bulb on an octal base. This designation has been discontinued in recent years. Letter "M" indicates a metal-coated glass envelope and octal base. Letter "X" indicates a "low loss" base, and letter "Y" indicates an "intermediate loss" base. Letters "A, B, C, D," etc., used in sequence indicate improved versions unilaterally interchangeable with the preceding versions. The letter "W" or "WA" indicates a military type tube.

System II. (for cathode ray and picture tubes)

a. A number indicating the nominal screen diameter or diagonal in inches.

b. A letter (s) assigned by RETMA generally in alphabetical order.

c. The letter "P" followed by a number indicating the type (color) of screen material. All Black and White television picture tubes are the "P4" type.

d. Letters "A, B, C, D," etc., used in sequence indicate improved versions unilaterally interchangeable with the preceding versions.

System III. A blanket-type designation covering all tubes that cannot be classified under Systems I and II. These are non-entertainment types. Numbers assigned in this group start from 5500 and work upward.

QUADRATURE FM DETECTOR FOR TELEVISION

The quadrature-grid sound detector for television receivers accomplishes limiting, detection and audio amplification all in one tube. Effective three-stage sound sections composed of one i-f amplifier, a quadrature-grid detector, and an audio output amplifier are then possible.

There are two types of quadrature-grid detector circuits. The one used with the 6BN6 utilizes the special gate construction of this tube. The other circuit has a "locked-oscillator" and employs tube type 6DT6 or similar types in which the control-grid and suppressor grid are both able to effect sharp cutoff of plate current.

Gated Beam Discriminator An example of the 6BN6 gated-beam-discriminator circuit is shown in figure 1A. The 6BN6 internal structure consists of three grids: a limiter gate, an accelerator, and a quadrature gate as shown in figure 2. The plate current is formed into a concentrated beam which is controlled by the limiter grid (Grid 1) and a quadrature grid (Grid 3).

The range between cutoff and saturation voltage is very small for the limiter grid, thus furnishing limiting action on signal peaks. The limiting removes amplitude modulation and noise pulses from the f-m signal.

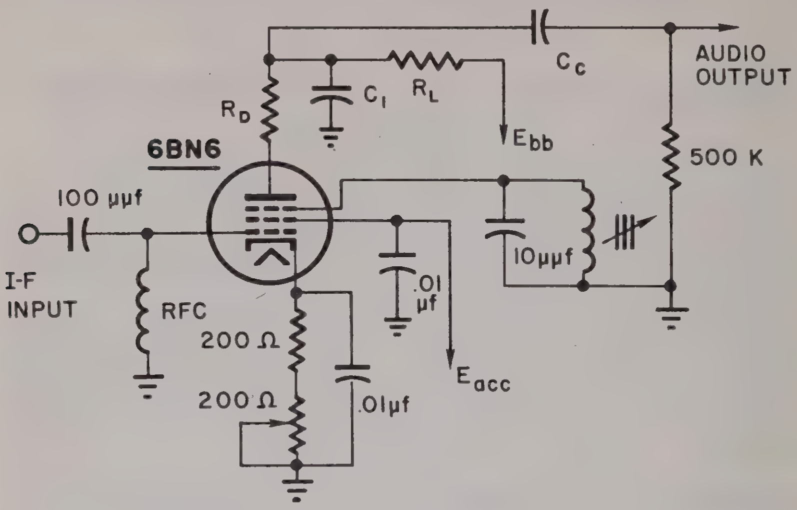
Limiter and quadrature grids are gates which swing open on positive signal peaks and close on negative peaks. When both gates are open simultaneously, the current will reach the plate of the tube. The amount of current that reaches the plate depends upon the length of time that both of the gates remain open. The time interval for plate current "on" varies with the modulation of the f-m signal. The signal is applied to the limiter grid and reaches the quadrature grid through the space charge existing within the tube. Because the signal reaches the quadrature grid through capacitive coupling, the voltage lag is 90 degrees; thus, it is called the quadrature grid.

When the signal is frequency modulated, the voltage developed across the quadrature-grid tank circuit has a variable phase about the 90-degree fixed-phase-difference with respect to the input signal. When the phase shift lags the signal voltage, the gates are open for a short interval. When the phase leads the signal voltage, then the gates are open for a longer interval. These intervals are changed into an audio signal by the resultant change in plate current amplitude. The i-f frequency component at 4.5 mc is bypassed from plate to ground and the remaining signal is the audio frequency voltage which has sufficient amplitude to drive the power output amplifier directly.

A buzz control is inserted in the cathode circuit to adjust the tube bias so that the proper level for limiting is set. It should be adjusted for minimum buzz in the audio output.

The Locked-Oscillator Discriminator The locked-oscillator, quadrature-grid detector circuit is quite similar to that used with the 6BN6. A typical circuit is shown in figure 1B. Operation is in two modes for either strong signals or weak signals. The locked-oscillator operation does not come into play unless the input signal is weak. Below a certain input signal level the detector will oscillate at a frequency of 4.5 megacycles in quadrature phase (90°) with the input signal regardless of the input signal amplitude.

Feedback from the quadrature-grid circuit to the control grid through the interelectrode capacitance of the tube causes this oscillation to occur. Strong signals swamp out the oscillation. Similar to the 6BN6 circuit, the quadrature-grid


6BN6
100 µµf
I-F INPUT
RFC
200 Ω
200 Ω
.01µf
R_D
C_1
R_L
E_bb
.01 µf
E_acc
10µµf
C_c
AUDIO OUTPUT
500 K

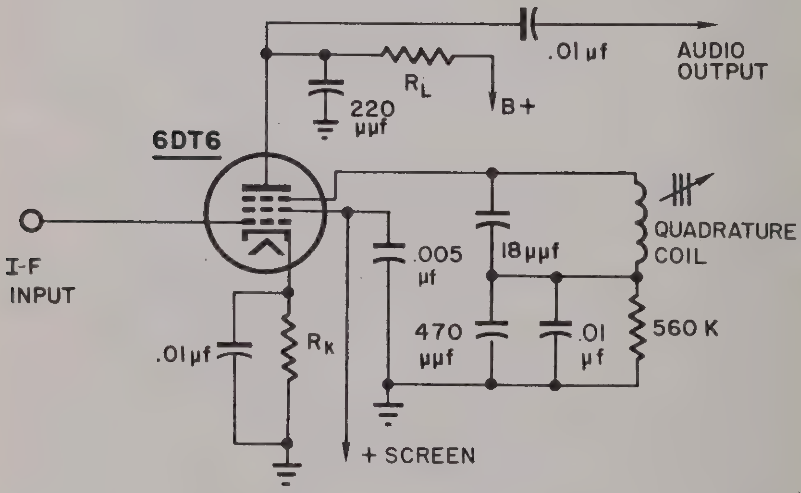

6DT6
I-F INPUT
.01µf
R_K
220 µµf
R_L
B+
.01 µf
AUDIO OUTPUT
.005 µf
18µµf
470 µµf
.01 µf
QUADRATURE COIL
560 K
+ SCREEN

Figure 1: Typical circuits for quadrature grid f-m detectors. (a) 6BN6 gated beam discriminator (b) 6DT6 locked-oscillator discriminator.

C_1: Integrating capacitor R_D: Plate linearity resistor

C_c: Coupling capacitor R_K: Grid bias resistor

R_L: Plate load resistor

Refer to operating characteristics of each tube type for values.

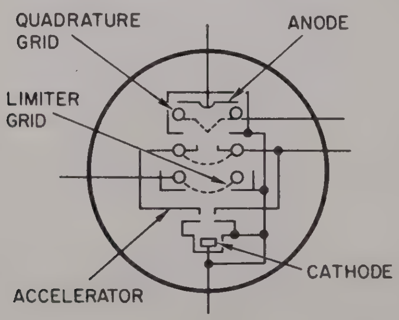

QUADRATURE GRID
ANODE
LIMITER GRID
CATHODE
ACCELERATOR

Figure 2: Internal construction of type 6BN6 showing its gated beam construction.

signal voltage varies in phase with f-m modulation. If oscillating, the phase of the oscillations follows the incoming sound i-f signal. The oscillation boosts the weak signal's sensitivity so that undistorted sound is received even with very weak signal strengths.

Limiting action for a-m rejection is accomplished in two ways. Amplitude degeneration occurs in the cathode circuit; and in the grid circuit, high signal levels will cause grid current to flow, thus limiting amplitude variations.

USE OF TUBE TESTERS

Tube testers are used by the serviceman to uncover defective tubes and help with difficult repair problems. However, tube testers are not infallible and have certain drawbacks. Realization of these drawbacks will help the technician to evaluate tubes intelligently.

Emission Tube Testers Early tube testers were of the emission type. This type of tester determined whether or not the filament or cathode was emitting electrons, or whether it was open or shorted. This type of test is of little value in modern tubes which have emission capabilities much greater than would be normally carried in conventional receiver circuits. It does point out whether or not a tube is dead but does not tell whether or not it will work or whether it will continue to work. There are only a few exceptions to this.

Emission testing of certain types of tubes can be destructive. The emission tester draws relatively large cathode currents when performing its function; therefore, tubes with very small cathodes and very close grid-to-cathode spacings should not be tested in it. Some of the tubes that should not be emission tested are uhf converter tubes, vhf tuner tubes, and the 12-volt B + automobile radio tubes which have a maximum plate voltage rating of only 30 volts.

Dynamic Tube Testers Mutual conductance, also called transconductance, is an important indication of the tube's ability to operate as an effective amplifier or control device. To be a useful measurement, it should be carried out under the same operating conditions that will be applied in actual use. Measurement of transconductance under one set of conditions cannot accurately predict performance under another set of conditions.

Transconductance is a figure of merit in a class A amplifier but is not a reliable indication of the performance of the tube in, for example, oscillator or pulse amplifier applications, or in horizontal and vertical deflection oscillator amplifier circuits in television receivers.

Modern service test equipment incorporates a modified transconductance test called the *Dynamic Mutual Conductance Test*. This is a simplified test that requires compromises in the design of the tube tester, thereby reducing accuracy and effectiveness. The dynamic-mutual-conductance tester is sensitive to a change in plate current in the tube. For a particular tube type, higher transconductance tubes generally require less bias for a certain plate current. Thus a tester with no bias adjustment will tend to read low on good high-gain amplifier tubes. In addition, there is the problem of shifting bias due to overdriving the grid. Better testers provide the means for setting the bias, plate, and screen voltages. These instruments are more accurate than those that do not provide adjustments. The instrument that provides reasonable adjustments can give a good quality measurement of the tube as an amplifier.

Set Testing Tubes Tube testers will not accurately measure certain tubes such as horizontal and vertical deflection tubes, which are the most probable cause of trouble in television receivers. Consequently, the tubes must then be tested by substitution in the receiver and observed for results. The tube manufacturer tests these tubes in special test sets designed to evaluate the quality of the tube for their intended service. There is no tube checker on the commercial market that will do this.

Short Test The short test was originally intended to indicate the presence of short-circuited electrodes within the tube. A short in this case has no resistance. However, the sensitivity of short testers has been increased to the point where they have become highly sensitive leakage testers. But the amount of leakage that may be tolerated depends upon the circuit in which the tube will be used, which is not always taken into consideration by the tester.

Few circuits in television will be affected by leakage resistance over 5 megohms, but one so-called leakage detector reads a tube as being questionable if it has over 1000 megohms of resistance between the grid and the cathode. The same tester shows questionable on tubes with 20 μa of heater cathode leakage, which is entirely normal for most vacuum tubes. This type of testing will unnecessarily reject many good tubes, including those that are brand new.

These sensitive leakage testers require a fairly high voltage to achieve their sensitivity. In some of these circuits, up to 75 volts may be applied between the grid and cathode of the tube which is far above the manufacturer's rating for that tube. Even worse, in some tubes, grid-to-cathode voltage should never exceed 25 volts; higher voltages will destroy the tube. The high electrostatic field across the extremely small spacing in modern tubes will draw particles away from the cathode and bridge the gap between the grid and cathode to form a short. The result is that testing a large quantity of new tubes in the tester may show them all to be short circuited.

Low Line Test As the tube tester is not always an effective instrument for measuring the tube's performance, some other method is required to evaluate them. No type of test is entirely infallible, but one simple test that eliminates those tubes which may fail in the near future is the *Low Line Test.* In this test the operating line voltage is reduced to 105 volts and the performance of the set is observed. A tube which fails to function under this condition may be assumed to be a poor risk and should be replaced. In a *Low Line Test,* cathode temperatures should be stabilized by allowing operation for at least five minutes under the reduced voltage conditions.

INSTALLATION AND HANDLING OF PICTURE TUBES

Considerable care should be exercised when picture tubes are installed or handled as breakage (implosion) of picture tubes may result in personal injury.

A. A suitable eye and face protective device should be used. Other parts of the body should be properly protected.

B. Picture tubes should be removed from the packing carton face up and supported by the sides of the bulb. Do not handle by the neck as it is the weakest portion of the tube.

C. When a tube is not in the set or in its packing carton, it should be placed downward with the faceplate resting on a soft pad of material free from abrasives.

D. Do not scratch or strike the tube, particularly the faceplate, as this may weaken the glass and result in implosion. Metal tubes are subject to damage if rim around the faceplate is bumped or struck.

E. Picture tubes should be inserted into their sockets by supporting the tube at the faceplate end. Hold the neck only to guide the base pins into the socket.

F. Picture tubes should be used in displays only if the vacuum seal has been broken. To break the seal of a picture tube: (1) Place the tube in a shipping carton face down. Have sufficient soft padding underneath for the base to extend above the closed cover. (2) Break off the base lug. (3) Make a small hole in the exhaust tip by using a small file or cutting pliers. (4) After air is allowed to leak into the tube at a slow rate the tip may be broken off entirely.

G. Picture tubes should be disposed of when they are no longer of use. A tube for disposal should be broken inside a sealed carton. One safe method is to drive a metal rod through the side of the sealed carton into the side of the tube.

H. Precautions should be taken to prevent the external conductive coating in the two by two square inch contact patch from being damaged and thus impairing the electrical ground connection to the coating. Also, care should be taken to prevent the external insulative coating around the anode button from becoming contaminated. Fingerprints, dust and other foreign materials on the insulative coating may cause electrical breakdown and other disturbances. This condition may be further aggravated by high humidity.

HIGH VOLTAGE PICTURE TUBE PRECAUTIONS

To prevent shock, the normal precautions used when dealing with high-voltage circuits should be carefully observed.

Before any part of the picture tube circuit is handled, the power supply switch should be turned off, the power plug disconnected, and both terminals of any capacitor discharged.

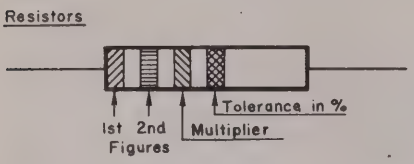
A high voltage charge may be carried by the external conductive coating on the bulb even after it has been removed from the equipment. Make sure this capacitive coating has been discharged by shorting the anode connection to the outside coating.

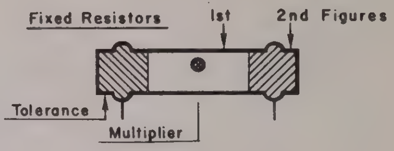
RETMA COLOR CODES

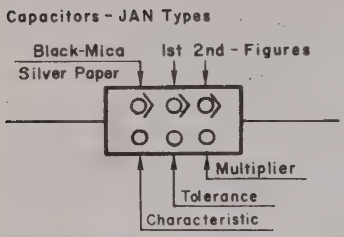
It is standard to indicate by color the numerical values for components such as composition resistors, mica capacitors, and ceramic capacitors. The numerical value represented by each color is given in the table *Numerical Values, Decimal Multipliers, and Tolerances.*

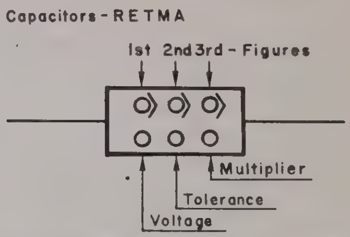
Capacitors Capacitors of the fixed mica type are marked by the several different methods shown in the figure. The 3-dot RETMA code method is for capacitor types rated at 500 volts and having a tolerance of ±20%. The other 6-dot methods indicate the voltage and tolerance by color. Fixed ceramic type capacitors may be marked by narrow bands or dots. If dots are used they have the same meaning as bands in the same order.

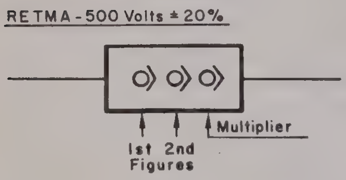
Resistors Resistors of the fixed composition type and including small wire-wound units in molded cases are coded as shown. Axial lead types employ color bands and the body color has no significance. Radial lead resistors employ the body-end-dot colors for numerical identification.


Resistors
Tolerance in %
1st 2nd
Figures
Multiplier


Fixed Resistors
1st
2nd Figures
Tolerance
Multiplier


Capacitors - JAN Types
Black-Mica
Silver Paper
1st 2nd - Figures
Multiplier
Tolerance
Characteristic


Capacitors - RETMA
1st 2nd 3rd - Figures
Multiplier
Tolerance
Voltage


RETMA - 500 Volts ± 20%
Multiplier
1st 2nd
Figures

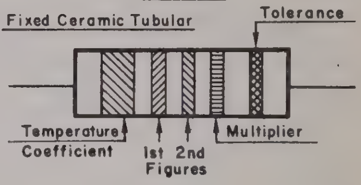

Fixed Ceramic Tubular
Tolerance
Temperature
Coefficient
1st 2nd
Figures
Multiplier

TABLE I

Resistor-Capacitor, Color Code

Color	Significant Figure	Decimal Multiplier	Tolerance (%)	Voltage Rating*
Black	0	1	—	—
Brown	1	10	1*	100
Red	2	100	2*	200
Orange	3	1000	3*	300
Yellow	4	10,000	4*	400
Green	5	100,000	5*	500
Blue	6	1,000,000	6*	600
Violet	7	10,000,000	7*	700
Gray	8	100,000,000	8*	800
White	9	1,000,000,000	9*	900
Gold	—	0.1	5	1000
Silver	—	0.01	10	2000
No color	—	—	20	500

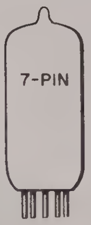
*Applies to capacitors only.

TABLE II

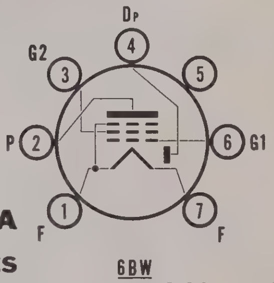
Color Code for Ceramic Capacitors

Color	Significant Figure	Decimal Multiplier	Capacitance Tolerance >10 $\mu\mu$f. (in %)	Capacitance Tolerance <10 $\mu\mu$f. (in $\mu\mu$f.)	Temp. Coeff. p.p.m./deg C.
Black	0	1	±20	2.0	0
Brown	1	10	± 1		— 30
Red	2	100	± 2		— 80
Orange	3	1000			—150
Yellow	4				—220
Green	5		± 5	0.5	—330
Blue	6				—470
Violet	7				—750
Gray	8	0.01		0.25	30
White	9	0.1	±10	1.0	500

CBS 1DN5



Detector and remote-cutoff audio amplifier for portable radios



FILAMENT CHARACTERISTICS

Voltage, d-c	1.4	volts
Current	50	ma

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Diode plate to grid 1, max.	0.04	μμf

MAXIMUM RATINGS (Design center values)

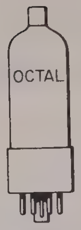
Plate voltage	90	volts
Grid 2 voltage	90	volts
Grid 1 voltage, negative d-c	—50	volts
Grid 1 voltage, positive d-c	0	volts
Cathode current	3	ma
Diode current for continuous operation	0.25	ma

CHARACTERISTICS AND TYPICAL OPERATION

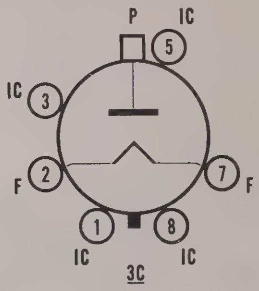
Class A Amplifier

Plate voltage	67.5	volts
Grid 2 (screen) voltage	67.5	volts
Grid 1 (control-grid) voltage	0	volts
Plate resistance (approx.)	0.6	meg
Transconductance	630	μmhos
Plate current	2.1	ma
Grid 2 current	0.55	ma
Grid 1 voltage (approx.) for $g_m = 10$ μmhos	—11.5	volts
Average diode current at 10 volts, d-c	1.0	ma

1G3GT/ 1B3GT



H-w rectifier for cathode-ray-tube anode supplies



FILAMENT CHARACTERISTICS

Voltage, a-c★	1.25	volts
Current	0.2	amp

★Must not exceed 1.45 volts or be less than 1.05 volts.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Plate to filament, approx.: p to f + i.s.	1.3	μμf

MAXIMUM RATINGS (Design center values unless noted)

Rectifier Service	R-f†	Flyback‡	
Plate voltage, peak inverse			
Total d-c and peak (absolute maximum)	33	26	kv
D-c		21	kv
Output current, d-c	1.0	0.5	ma
Plate current, peak steady state	30	50	ma

CHARACTERISTICS

Tube voltage drop, conducting 7 ma	100	volts

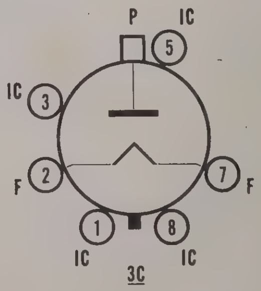
NOTES:

†Frequency range of supply voltage is 1.5 Kc to 100 Kc.

‡Voltage pulse duration must not exceed 10 μs in a 30-frame, 525-line system.

1J3 /1K3

H-w rectifier for cathode-ray-tube anode supplies



FILAMENT CHARACTERISTICS

Voltage, a-c★	1.25	volts
Current	0.2	amp

★Must not exceed 1.45 volts or be less than 1.05 volts.

1J3/1K3 (cont.)

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Plate to filament, approx.: p to f + i.s.	1.6	$\mu\mu$f

MAXIMUM RATINGS (Design center values unless noted)

Rectifier Service†

Plate voltage, peak inverse		
Total d-c and peak (absolute maximum)	26	kv
D-c	21	kv
Output current, d-c	0.5	ma
Plate current, peak steady state	50	ma

CHARACTERISTICS

Tube voltage drop, conducting 7 ma	250	volts

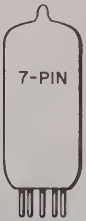
NOTE:

†Voltage pulse duration must not exceed 10 μs in a 30-frame, 525-line system.

Type 1K3 is identical to type 1J3 except for bulb length.

CBS

2CY5

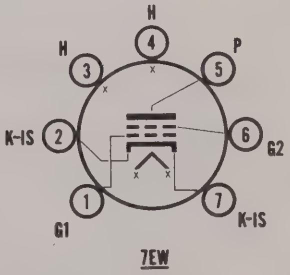


Tetrode voltage amplifier for r-f service in VHF tuners of series string heater TV receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	2.4	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode	100	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES	Shield♦	
Grid to plate: g1 to p, max.	0.03	$\mu\mu$f
Input: g1 to k + h + g2	4.3	$\mu\mu$f
Output: p to k + h + g2	2.75	$\mu\mu$f

♦JETEC shield 316 connected to cathode.

MAXIMUM RATINGS (Design maximum values)

Plate voltage	180	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	180	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	2.0	watts
Grid 2 dissipation	0.5	watt
Cathode current	20	ma

2CY5 (cont.)

CHARACTERISTICS AND TYPICAL OPERATION

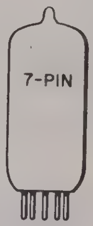
Class A Amplifier

Plate voltage	125	volts
Grid 2 (screen) voltage	80	volts
Grid 1 (control-grid) voltage	—1	volts
Plate resistance (approx.)	0.125	meg
Transconductance	8000	μmhos
Plate current	10	ma
Grid 2 current	1.4	ma
Grid 1 voltage (approx.) for $I_b = 20$ μa	—6	volts

NOTES:

Other heater voltage versions of this tube include types: 3CY5 with a 2.9 volt, 450 ma warm-up controlled heater; 4CY5 with a 4.5 volt, 300 ma warm-up controlled heater; 6CY5 with a 6.3 volt, 200 ma heater.

CBS 3AF4A



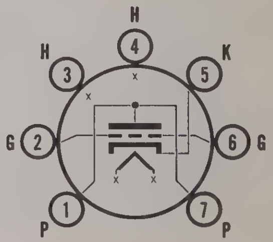
Triode for uhf local oscillator service, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.2	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	50	volts
Heater positive to cathode★	50	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 25 volts max.

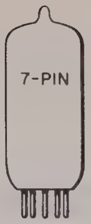


7DK

Type 3AF4A is identical to types 2AF4A and 6AF4A except for heater characteristics. Refer to type 2AF4A for additional data.

3B2 (See chart)

CBS 3CY5

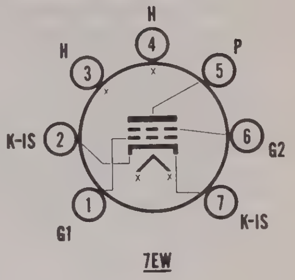


Tetrode voltage amplifier for r-f service in VHF tuners of series string heater TV receivers

HEATER CHARACTERISTICS

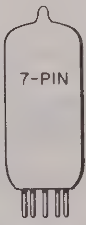
Voltage, a-c or d-c	2.9	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode	100	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)



Type 3CY5 is identical to types 2CY5, 4CY5, and 6CY5 except for heater characteristics. Refer to type 2CY5 for additional data.

CBS 3DK6



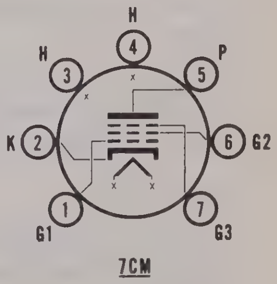
Pentode amplifier for i-f service in TV receivers, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	3.15	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	300	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	0.020	μμf
Input: g1 to k + h + g2 + g3	6.3	μμf
Output: p to k + h + g2 + g3	1.9	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	300	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	2.0	watts
Grid 2 dissipation	0.5	watt

3DK6 (cont.)

CHARACTERISTICS AND TYPICAL OPERATION

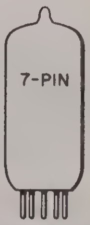
Class A Amplifier

Plate voltage	125	volts
Grid 3 (suppressor)	connect to cathode at socket	
Grid 2 (screen) voltage	125	volts
Cathode bias resistor	56	ohms
Plate resistance (approx.)	0.35	meg
Transconductance	9800	μmhos
Plate current	12.0	ma
Grid 2 current	3.8	ma
Grid 1 voltage (approx.) for $I_b = 20$ μa	−6.5	volts

NOTE:

Other heater voltage versions of this tube include types: 4DK6 with a 4.2 volt, 450 ma warm-up controlled heater; 6DK6 with a 6.3 volt, 600 ma heater.

CBS 4BZ6



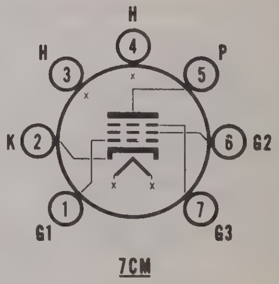
Pentode i-f amplifier for gain-controlled stages, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.2	volts
Current ±6%	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of Handbook APPENDIX)

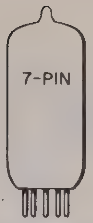
★D-c component must not exceed 100 volts max.



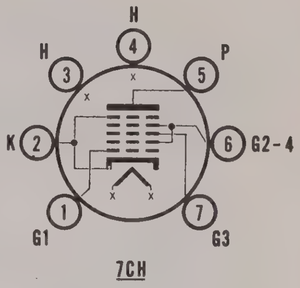
Type 4BZ6 is identical to types 3BZ6 and 6BZ6 except for heater characteristics. Refer to type 3BZ6 for additional data.

4CE5 (See chart)

CBS 4CS6



Heptode sync separator and clipper, heater warm-up controlled for series strings



HEATER CHARACTERISTICS

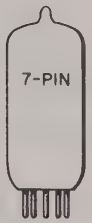
Voltage, a-c or d-c	4.2	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 sec. average	

(See Series-String Heaters section of Handbook APPENDIX)

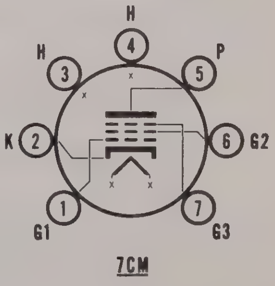
★D-c component must not exceed 100 volts max.

Type 4CS6 is identical to types 3CS6 and 6CS6 except for heater characteristics. Refer to type 3CS6 for additional data.

CBS 4DE6



Controlled cutoff intermediate-frequency amplifier heater warm-up controlled for series strings



HEATER CHARACTERISTICS

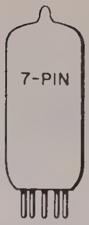
Voltage, a-c or d-c	4.2	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of Handbook APPENDIX)

★D-c component 100 volts max.

Type 4DE6 is identical to types 3DE6 and 6DE6 except for heater characteristics. Refer to type 3DE6 for additional data.

CBS 4DK6



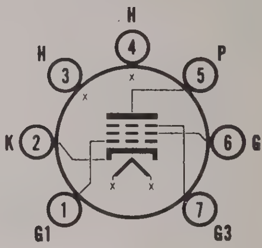
Pentode amplifier for i-f service in TV receivers, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.2	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	300	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

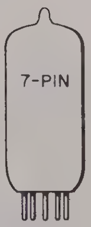
(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component 100 volts max.



7CM

CBS 4DT6



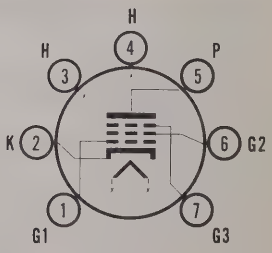
Dual controlled pentode for f-m detector and limiter, mixer, or gain-controlled amplifier use, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.2	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 100 volts max.

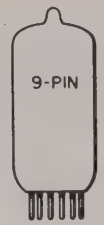


7EN

Type 4DT6 is identical to types 3DT6 and 6DT6 for heater characteristics. Refer to type 3DT6 for additional data.

5BS8 (See chart)

CBS 5BT8



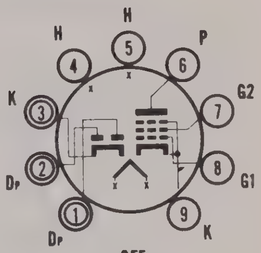
Detector combined with video, i-f, or agc amplifier, heater warm-up controlled for series-strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	4.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 100 volts max.



9FE

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Diode Section

Input: p to k + h	1.3	μμf
Cathode to heater and plate	3.0	μμf

Pentode Section

Grid to plate: g1 to p, max.	0.04	μμf
Input: g1 to k + h + g2 + g3	7.0	μμf
Output: p to k + h + g2 + g3	2.3	μμf
Coupling: pentode grid 1 to diode plate	0.005	μμf
Coupling: pentode plate to diode plate	0.020	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	300	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	2.0	watts
Grid 2 dissipation	0.5	watts
Grid 1 circuit resistance		
Fixed bias	0.25	meg
Cathode bias	1.0	meg
Diode current for continuous operation, per plate	1.0	ma

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate supply voltage	200	volts
Grid 2 (screen) supply voltage	150	volts
Cathode-bias resistor	180	ohms
Plate resistance (approx.)	0.3	meg
Transconductance	6200	μmhos
Plate current	9.5	ma
Grid 2 current	2.8	ma
Grid 1 voltage (approx.) for I_b=10μa	—8	volts
Diode plate current for diode voltage of 10Vdc	8.0	ma

5DH8 (cont.)

CHARACTERISTICS AND TYPICAL OPERATION

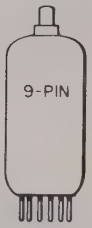
Class A Amplifier	Triode	Pentode	
Plate voltage	250	125	volts
Grid 2 (screen) voltage		125	volts
Cathode-bias resistor	390	56	ohms
Plate resistance (approx.)	12,000	150,000	ohms
Transconductance	4,400	8,600	µmhos
Amplification factor	53		
Plate current	7.3	13.5	ma
Grid 2 current		3.8	ma
Grid 1 voltage (approx.) for $I_b = 10$ µa	−10		volts
Grid 1 voltage (approx.) for $I_b = 20$ µa		−6	volts

NOTES:

†Voltage pulse duration must not exceed 2500µs in a 525-line, 30-frame system.

5EA8 · 5EH8 · 5R4GYA · 5V3 (See chart)

CBS 6AF3



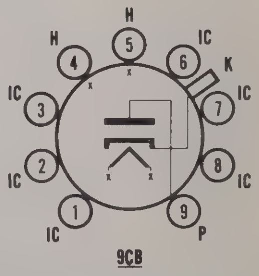
Damper diode for television horizontal sweep circuits

HEATER CHARACTERISTICS

Voltage	6.3±10%	volts
Current	1.2	amps
Peak heater-cathode voltage, max.*†		
Heater negative to cathode♦	4500	volts
Heater positive to cathode★	300	volts

♦D-c component must not exceed 1000 volts max.

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Heater to cathode: h to k	2.8	µµf
Cathode to plate-and-heater: k to p + h	9.0	µµf
Plate to cathode-and-heater: p to k + h	6.0	µµf

MAXIMUM RATINGS (Design center values unless noted)

TV Damper Service*		
Plate voltage, peak inverse	4500	volts
Plate current, d-c	185	ma
Plate current, peak steady state	750	ma
Plate dissipation	6.0	watts
Bulb temperature at hottest point	210	C

AVERAGE CHARACTERISTICS

Tube voltage drop at 340 ma	30	volts

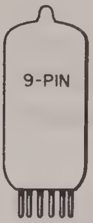
NOTES:

*Voltage pulse duration must not exceed 10µs in a 525-line, 30-frame system.

†Design maximum value.

6AN8A (See chart)

CBS 6BJ8



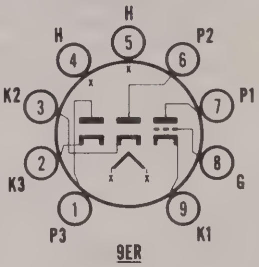
Horizontal deflection oscillator combined with duodiode phase splitter or comparator, warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	600	ma
Peak heater-cathode voltage, max. (Triode and diodes)		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode		
Grid to Plate: g to p	2.6	μμf
Input: g to h + T_k	2.8	μμf
Output: p to h + T_k	0.31	μμf
Diodes		
Diode 1 plate to triode grid, max.	0.070	μμf
Diode 2 plate to triode grid, max.	0.11	μμf
Diode 1 cathode to all	4.8	μμf
Diode 2 cathode to all	4.8	μμf
Diode 1 plate to diode 2 plate, max.	0.060	μμf
Diode 1 plate to diode 1 cathode: $1D_p$ to $1D_k$ + h	1.9	μμf
Diode 2 plate to diode 2 cathode: $2D_p$ to $2D_k$ + h	1.9	μμf
Diode 1 cathode to diode 1 plate: $1D_k + 1D_p$ + h	4.6	μμf
Diode 2 cathode to diode 2 plate: $2D_k + 2D_p$ + h	4.6	μμf
Diode 1 plate to all	3.0	μμf
Diode 2 plate to all	3.0	μμf

MAXIMUM RATINGS (Design center values)

Triode Section	Class A1 Amplifier	Vertical Deflection Amplifier†	
Plate voltage	300	300	volts
Plate voltage, peak pos. (absolute max.)		12,000	volts
Control grid voltage, positive d-c	0		
Control grid voltage, peak negative pulse		250	volts
Plate dissipation‡	3.5	3.5	watts
Cathode current, average	20	20	ma
Cathode current, peak		70	ma
Control grid circuit resistance			
Fixed bias	1.0		meg
Self bias		2.2	meg
Diodes Section			
Peak plate current, each plate		54	ma
D-c current, each plate		9	ma

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	90	250	volts
Grid voltage	0	—9	volts
Plate resistance (approx.)	4,700	7,150	ohms
Transconductance	4,700	2,800	µmhos
Amplification factor	22	20	
Plate current	13.5	8.0	ma
Plate current at E_c=12.5Vdc		1.7	ma
Grid voltage (approx.) for I_b=10µa	—7	—18	volts

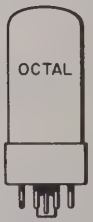
DIODE CHARACTERISTICS (**each diode**)

Average current at 10Vdc		50	ma
Voltage drop at I_b=9mAdc		2.6	volts

†Voltage pulse duration must not exceed 2500µs in a 525-line, 30-frame system.

‡Tube protection is needed for no-drive conditions if grid-resistor bias is used.

CBS 6BL7GTA



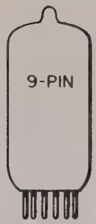
Vertical deflection amplifier and/or oscillator for television receivers

The 6BL7GTA is interchangeable with type 6BL7GT differing only by having an improved section 1 for longer life as an oscillator, and controlled zero-bias plate current in both sections.

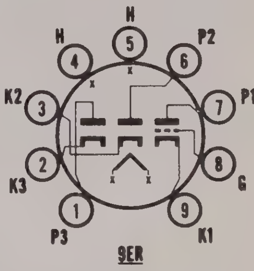
Controlled Plate Current Characteristic

E_b=150Vdc E_c=0V I_b=65mA

CBS 6BN8



Multipurpose triode amplifier and duodiode phase detector combined for use in TV receivers, warm-up controlled for series strings



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	600	ma
Peak heater-cathode voltage, max. (Triode and diodes)		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode

Grid to Plate: g to p	2.5	μμf
Input: g to $h + T_k$	3.6	μμf
Output: p to $h + T_k$	0.25	μμf

Diodes

Diode 1 plate to triode grid, max.	0.060	μμf
Diode 2 plate to triode grid, max.	0.10	μμf
Diode 1 cathode to all	5.0	μμf
Diode 2 cathode to all	5.0	μμf
Diode 1 plate to diode 2 plate, max.	0.070	μμf
Diode 1 plate to diode 1 cathode: $1D_p$ to $1D_k + h$	1.9	μμf
Diode 2 plate to diode 2 cathode: $2D_p$ to $2D_k + h$	1 9	μμf
Diode 1 cathode to diode 1 plate: $1D_k$ to $1D_p + h$	4.8	μμf
Diode 2 cathode to diode 2 plate: $2D_k$ to $2D_p + h$	4.8	μμf
Diode 1 plate to all	3.0	μμf
Diode 2 plate to all	3.0	μμf

MAXIMUM RATINGS (Design center values)

Triode Section

Plate voltage	300	volts
Control grid voltage, positive d-c	0	volts
Plate dissipation	1.5	watts
Control grid circuit resistance	1.0	meg

Diode Section

Peak plate current, each plate	54	ma
D-c current, each plate	9	ma

CHARACTERISTICS AND TYPICAL OPERATION

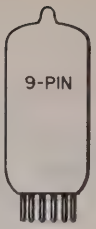
Class A Amplifier

Plate voltage	100	250	volts
Grid voltage	—1	—3	volts
Plate resistance (approx.)	21,000	28,000	ohms
Transconductance	3,500	2,500	μmhos
Amplification factor	75	70	
Plate current	1.5	1.6	ma
Grid voltage (approx.) for $I_b=10\mu a$	—2.5	—5.5	volts

Diode Characteristics (each diode)

Average current at 10Vdc	50	ma
Voltage drop at I_b=9mAdc	2.6	volts

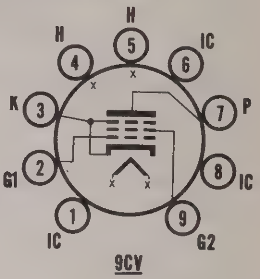
CBS 6BQ5



General purpose power amplifier with high power output and high power sensitivity

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	760	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode	100	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	0.5	μμf
Input: g1 to all	10.8	μμf
Output: p to all	6.5	μμf
Grid to heater: g1 to h, max.	0.25	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	300*	volts
Plate supply voltage	550	volts
Grid 2 voltage	300	volts
Grid 2 supply voltage	550	volts
Negative grid 1 voltage	100	volts
Plate dissipation	12*	watts
Grid 2 dissipation, average	2	watts
Grid 2 dissipation, peak	4	watts
Cathode current, average	65	ma
Grid 1 voltage for grid current starting point with I_{c1} = 0.3 μa	—1.3	volts
Grid circuit resistance		
Fixed bias	0.3	meg
Self bias	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier (Single Tube)	Triode Connected†	Pentode	
Plate voltage	250	250	volts
Grid 2 (screen) voltage		250	volts
Grid 1 (control-grid) voltage		—7.3	volts
Cathode bias resistor	270	135	ohms
Plate resistance (approx.)		38,000	ohms
Transconductance		11,300	μmhos
Grid 1 input voltage, peak a-f	9.4	6.0	volts
Plate current, zero signal	34	48	ma
Plate current, maximum signal	36	49.5	ma
Grid 2 current, zero signal		5.5	ma
Grid 2 current, maximum signal		10.8	ma
Load resistance impedance	3500	5200	ohms
Total harmonic distortion (approx.)	9	10	%
Power output, maximum signal	1.95	5.7	watts
Amplification factor of grid 2 with respect to grid 1 zero signal		19	

6BQ5 (cont.)

PUSH-PULL AMPLIFIER (Value for two tubes)

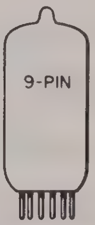
	Class AB		Class B		
Plate voltage	250	300	250	300	volts
Grid 2 (screen) voltage	250	300	250	300	volts
Grid 1 (control-grid) voltage			11.6	14.7	volts
Cathode bias resistor	130	130			ohms
Grid-to-grid input voltage, peak a-f	22.4	28	22.4	28	volts
Plate current, zero signal	62	72	20	15	ma
Plate current, maximum signal	75	92	75	92	ma
Grid 2 current, zero signal	7	8	2.2	1.6	ma
Grid 2 current, maximum signal	15	22	15	22	ma
Load resistance, plate-to-plate	8000	8000	8000	8000	ohms
Total harmonic distortion (approx.)	3	4	3	4	%
Power output, maximum signal	11	17	11	17	watts

NOTES:

*When the heater and positive voltage are obtained from a storage battery by means of a vibrator, the maximum values of the plate and grid 2 voltages are 250 volts and the plate dissipation is 9 watts.

†Grid 2 connected to plate.

CBS 6BR8A



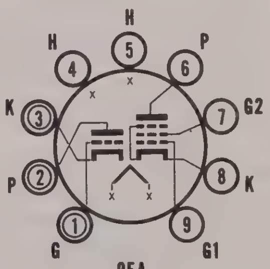
Vhf local oscillator and mixer for fm and television receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	250	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of Handbook APPENDIX)

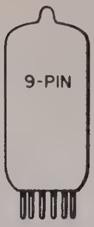
★D-c component must not exceed 100 volts max.



9FA

Type 6BR8A is identical to type 5BR8 except for heater characteristics.

CBS 6BT8

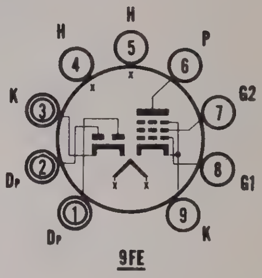


Detector combined with video, i-f, or agc amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

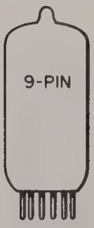
★D-c component must not exceed 100 volts max.



Type 6BT8 is identical to type 5BT8 except for heater characteristics. Refer to type 5BT8 for additional data.

6BW4 (See chart)

CBS 6BW8



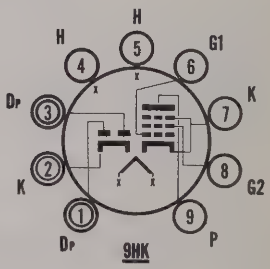
Sound i-f amplifier, sound limiter, or agc keyer combined with a double diode phase detector

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3±10%	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Pentode Section

Grid to plate: g1 to p, max.	0.020	μμf
Input: g1 to k + h + g2 + g3	4.8	μμf
Output: p to k + h + g2 + g3	2.6	μμf

Diode Section

Grid 1 to each diode plate, max.	0.006	μμf
Diode 1 plate to diode cathode and heater	1.3	μμf
Diode 2 plate to diode cathode and heater	1.2	μμf

6BW8 (cont.)

MAXIMUM RATINGS (**Design maximum values**)

Plate voltage	330	volts
Grid 2 voltage	See Rating Chart in APPENDIX	
Grid 2 supply voltage	330	volts
Grid 1 voltage, negative d-c	—55	volts
Grid 1 voltage, positive d-c	0	volts
Plate dissipation	3.0	watts
Grid 2 dissipation	0.55	watt
Diode current for continuous operation, each diode	5.0	ma
Grid 1 circuit resistance		
Fixed bias	0.1	meg
Cathode bias	0.5	meg

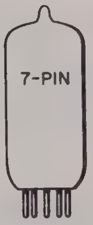
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	250	volts
Grid 2 (screen) voltage	110	volts
Cathode bias resistor	68	ohms
Plate resistance (approx.)	0.25	meg
Transconductance	5,200	μmhos
Plate current	10	ma
Grid 2 current	3.5	ma
Grid 1 voltage (approx.) for I_b=10μa	—10	volts
Average diode current at E_b=5Vdc, each diode	20	ma

6BX8 • 6BY4 • 6BZ8 / X155 (See chart)

CBS 6CA5

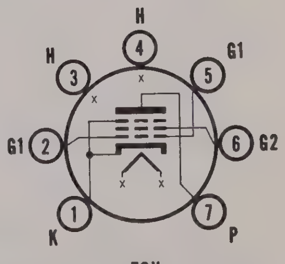


A-f power amplifier with high output from a low B supply voltage

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1200	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



7CV

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.5	μμf
Input: g1 to k + h + g2 + b.p.	15.0	μμf
Output: p to k + h + g2 + b.p.	9.0	μμf

6CA5 (cont.)

MAXIMUM RATINGS (Design center values)

Plate voltage	130	volts
Grid 2 voltage	130	volts
Grid voltage, peak positive	0	volts
Plate dissipation	5.0	watts
Grid 2 dissipation	1.4	watts
Grid circuit resistance		
Fixed bias	0.5	meg
Self bias	0.5	meg
Bulb temperature at hottest point	180	°C

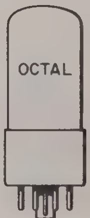
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	110	125	volts
Grid 2 (screen) voltage	110	125	volts
Grid 1 (control-grid) voltage	—4.0	—4.5	volts
Plate resistance (approx.)	16,000	15,000	ohms
Transconductance	8100	9200	μmhos
Grid 1 input voltage, peak a-f	4.0	4.5	volts
Plate current, zero signal	32	37	ma
Plate current, maximum signal	31	36	ma
Grid 2 current, zero signal	3.5	4.0	ma
Grid 2 current, maximum signal	7.5	11.0	ma
Load resistance impedance	3500	4500	ohms
Total harmonic distortion (approx.)	5	6	%
Power output, maximum signal	1.1	1.5	watts

6CH7 (See chart)

CBS 6CK4

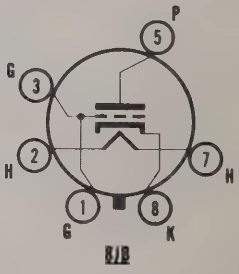


Vertical deflection amplifier for television receivers

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.25	amps
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive tc cathode★	200	volts

★D-c componenτ must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	6.5	μμf
Input: g1 to k + h	8.0	μμf
Output: p to k + h	1.8	μμf

6CK4 (cont.)

MAXIMUM RATINGS (**Design maximum values**)

Vertical Deflection Amplifier†

Plate voltage, d-c	550	volts
Plate voltage, peak pos. (absolute max.)	2000	volts
Plate voltage, peak negative	250	volts
Plate dissipation‡	12.0	watts
Cathode current, average	100	ma
Cathode current, peak	350	ma
Control-grid circuit resistance Self bias	2.2	meg

AVERAGE CHARACTERISTICS

	Instantaneous Values	Class A	
Plate voltage	100	250	volts
Control-grid voltage	0	−28	volts
Plate resistance (approx.)		1200	ohms
Transconductance		5500	µmhos
Amplification factor		6.6	
Plate current	125	40	ma
Grid 1 voltage (approx.) for I_b=0.5ma		−50	volts
Plate current at E_c=−38Vdc		10	ma

NOTES:

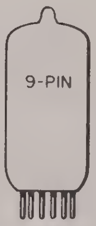
†Voltage pulse duration must not exceed 2500µs in a 525-line, 30-frame system.

‡Tube protection is needed for no-drive conditions if grid-resistor bias is used.

6CL5 (See chart)

CBS

6CL8A



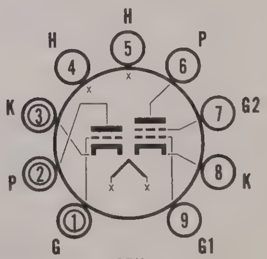
Very-high-frequency oscillator and mixer used in TV tuners

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

Warm-up time ....11 secs. average (See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 100 volts max.



9FX

Type 6CL8A is similar to types 5CL8 and 6CL8. Refer to type 5CL8 for data other than that given (heater characteristics, C_{gp}, and g_m). The 6CL8A is unilaterally interchangeable with the 6CL8 since it differs only in C_{gp} and transconductance as given below.

6CL8A(cont.)

DIRECT INTERELECTRODE CAPACITANCE

	Shield†	No Shield	
Tetrode section; grid 1 to plate, max.	0.010	0.020	μμf

AVERAGE CHARACTERISTICS

Conditions: $E_b=125V$, $E_{c2}=125V$, $E_{c1}=-1.0V$

Transconductance .... 6400 μmhos

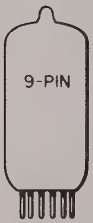
Conditions: $E_b=100V$, $E_{c2}=100V$, $E_{c1}=0V$

Transconductance .... 8000 μmhos

†With JETEC 315 shield connected to cathode.

6CM8 (See chart)

6CQ8



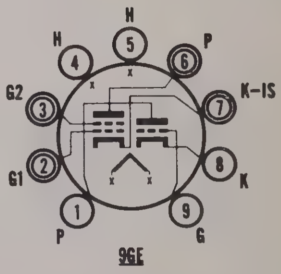
Phase-splitter, sync separator, sync clipper, and i-f amplifier or triode local oscillator and pentode mixer

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 100 volts max.

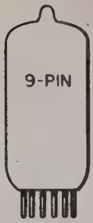


Type 6CQ8 is identical to type 5CQ8 except for heater characteristics. Refer to type 5CQ8 for additional data.

6CR8 · 6CS8 (See chart)

CBS

6CU8



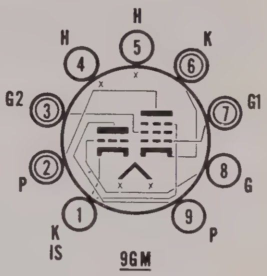
Sync clipper, sync separator, etc. and i-f or video amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage max.		
Heater negative to cathode	200	volts
Heater positive to cathode	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

Grid to plate: g1 to p	1.6	μμf
Input: g1 to k + h + pentode g3 + i.s.	1.9	μμf
Output: p to k + h + pentode g3 + i.s.	1.6	μμf

Pentode Section

Grid to plate: g1 to p, max.	0.025	μμf
Input: g1 to k + h + g2 + g3 + triode k + i.s.	7.0	μμf
Output: p to k + h + g2 + g3 + triode k + i.s.	2.4	μμf
Coupling: pentode grid 1 to triode plate	0.02	μμf
Coupling: pentode plate to triode grid	0.005	μμf
Coupling: pentode plate to triode plate	0.04	μμf

MAXIMUM RATINGS (Design center values)

	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.6	2.0	watts
Grid 2 dissipation		0.5	watt
Grid 1 circuit resistance*			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

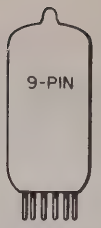
Class A Amplifier	Triode	Pentode	
Plate supply voltage	200	200	volts
Grid 2 (screen) supply voltage		150	volts
Grid 1 (control-grid) voltage	−6		volts
Cathode-bias resistor		180	ohms
Plate resistance (approx.)	.00575	0.30	meg
Transconductance	3300	6200	μmhos
Amplification factor	19		
Plate current	13	9.5	ma
Grid 2 current		2.8	ma
Grid 1 voltage (approx.) for $I_b = 10\mu a$	−19	−8	volts

NOTE:

*If either unit is operating at maximum rated conditions, Grid 1 circuit resistance for both units should not exceed the values given.

CBS

6CX8



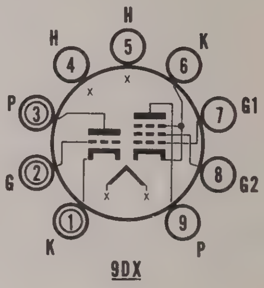
Combined sync amplifier, sync separator, or sync clipper, etc., and video or i-f amplifier

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	750	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

Grid to plate: g1 to p	4.4	μμf
Input: g1 to k + h	2.2	μμf
Output: p to k + h	0.38	μμf

Pentode Section

Grid to plate: g1 to p	0.06	μμf
Input: g1 to k + h + g2 + g3	9.0	μμf
Output: p to k + h + g2 + g3	4.4	μμf
Coupling: pentode grid 1 to triode plate, max.	.005	μμf
Coupling: pentode plate to triode grid, max.	.018	μμf
Coupling: pentode plate to triode plate, max.	0.17	μμf

MAXIMUM RATINGS (Design maximum values)

	Triode	Pentode	
Plate voltage	330	330	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		330	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.0	5.0	watts
Grid 2 dissipation		1.1	watts
Grid 1 circuit resistance			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

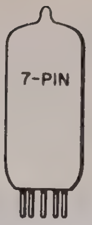
	Triode	Pentode		
Plate voltage	150	200	40	volts
Grid 2 (screen) voltage		125	125	volts
Grid 1 (control-grid) voltage			0†	volts
Cathode-bias resistor	150	68		ohms
Plate resistance (approx.)	8700	70,000		ohms
Transconductance	4600	10,000		μmhos
Amplification factor	40			
Plate current	9.2	24	40	ma
Grid 2 current		5.2	15.5	ma
Grid 1 voltage (approx.) for $I_b = 100\ \mu a$	−50	−8.5		volts

NOTE:

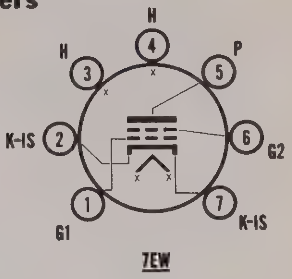
†Applied for short interval of two seconds maximum to prevent damage to the tube.

CBS

6CY5



Tetrode voltage amplifier for r-f service in VHF television tuners



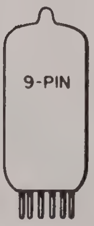
HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	200	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode	100	volts

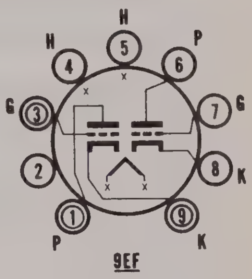
Type 6CY5 is identical to type 2CY5, 3CY5, and 4CY5 except for heater characteristics. Refer to type 2CY5 for characteristics and ratings.

CBS

6CY7



Dissimilar duotriode for TV deflection oscillator and amplifier applications



HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3 ±10%	volts
Current	750	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1	Section 2	
Grid to plate: g1 to p	1.8	4.4	μμf
Input: g1 to k + h	1.5	5.0	μμf
Output: p to k + h	0.30	1.0	μμf

MAXIMUM RATINGS (Design maximum values)

Vertical Deflection, Service*	Section 1† Oscillator	Section 2† Amplifier	
Plate voltage, d-c	350	350	volts
Plate voltage, peak positive pulse		1800	volts
Control-grid voltage, peak negative d-c	400	250	volts
Plate dissipation	1.0	5.5‡	watts
Cathode current, d-c		35	ma
Cathode current, peak		120	ma
Control-grid circuit resistance			
Fixed bias	2.2		meg
Cathode bias	2.2	2.2	meg

CHARACTERISTICS	Section 1† Oscillator	Section 2† Amplifier		
Plate voltage	250	60	150	volts
Control-grid volatge	—3.0	0		volts
Cathode-bias resistor			620	ohms
Plate resistance (approx.)	52,000		920	ohms
Transconductance	1300		5400	μmhos
Amplification factor	68		5.0	
Plate current	1.2	80	30	ma
Control-grid voltage (approx.) for $I_b = 200\ \mu a$			—40	volts
Control-grid voltage (approx.) for $I_b = 10\ \mu a$	—5.5			volts
Plate current (approx.) for $I_c =$ —30 volts			3.5	ma

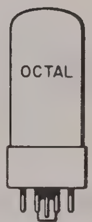
NOTES:

†Section 1 connects to pins 6, 7, and 8. Section 2 connects to pins 1, 3, and 9.

*Voltage pulse duration must not exceed 2500 μs in a 525-line, 30-frame system.

‡Tube protection is needed for no drive conditions if grid leak bias is used.

CBS 6DA4



TV damper diode for horizontal deflection circuits, heater warm-up time controlled for series-string circuits

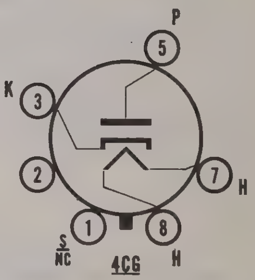
HEATER CHARACTERISTICS

Voltage	6.3	volts
Current	1.2	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode†♦	4400	volts
Heater positive to cathode★	300	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

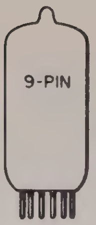
♦D-c component must not exceed 900 volts max.

★D-c component must not exceed 100 volts max.



Type 6DA4 is identical to type 12D4 except for heater characteristics. Refer to 12D4 for other data.

CBS 6DE7

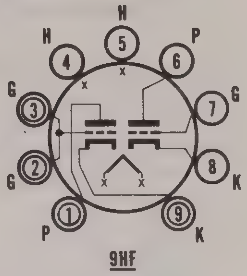


Television vertical deflection amplifier and oscillator

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	900	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1	Section 2	
Grid to plate: g1 to p	4.0	8.5	μμf
Input: g1 to k + h	2.2	5.5	μμf
Output: p to k + h	0.52	1.0	μμf

MAXIMUM RATINGS (Design maximum values unless noted)

Vertical Deflection Oscillator and Amplifier†

	Section 1 ♦ Oscillator	Section 2 Amplifier	
Plate voltage, d-c	330	275	volts
Plate voltage, peak pos. (absolute max.)		1500	volts
Control-grid voltage, peak negative	400	250	volts
Plate dissipation (each plate)‡	1.5	7.0	watts
Cathode current, average	22	50	ma
Cathode current, peak	77	175	ma
Control-grid circuit resistance Self bias	2.2	2.2	meg

AVERAGE CHARACTERISTICS

	Section 1	Section 2	
Plate voltage	250	150	volts
Control-grid voltage	—11	—17.5	volts
Plate resistance (approx.)	8750	925	ohms
Transconductance	2000	6500	μmhos
Amplification factor	17.5	6	
Plate current	5.5	35	ma
Grid 1 voltage (approx.) for I_b=10μa	—20		volts
Grid 1 voltage (approx.) for I_b=50μa		—44	volts
Plate current at E_c=—24Vdc		10	ma
Zero bias plate current E_b=60V, E_c=0V (Instantaneous values)		80	ma

NOTES:

†Voltage pulse duration must not exceed 2500μs in a 525-line, 30-frame system.

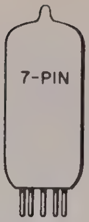
‡Tube protection is needed for no-drive conditions if grid-resistor bias is used.

♦Section 1 connects to pins 6, 7, and 8.

6DG7 (See chart)

CBS

6DK6



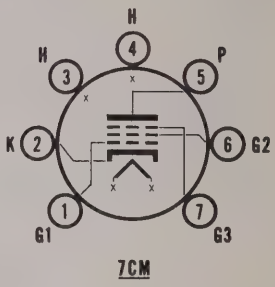
Pentode amplifier for i-f service in TV receivers, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	300	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	300	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of APPENDIX in CBS Tube Manual)

★D-c component 100 volts max.



Type 6DK6 is identical to type 3DK6 except for heater characteristics. Refer to 3DK6 for other data.

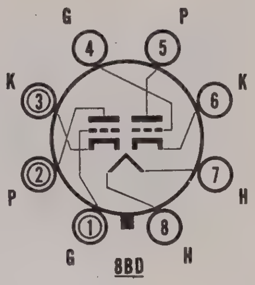
CBS 6DN7

Television vertical deflection amplifier and oscillator in one envelope

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3±10%	volts
Current	900	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1	Section 2	
Grid to plate: g1 to p	4.0	5.5	μμf
Input: g1 to k + h	2.2	4.6	μμf
Output: p to k + h	0.7	1.0	μμf

MAXIMUM RATINGS (Design maximum values)†

Vertical Deflection Service in Television

	Oscillator Section 1	Amplifier Section 2	
Plate voltage, d-c	350	550	volts
Plate voltage, peak pos. (absolute max.)		2500	volts
Control-grid voltage, peak negative	400	250	volts
Plate dissipation	1.0	10‡	watts
Cathode current, avg.		50	ma
Cathode current, peak		150	ma
Control-grid circuit resistance			
Fixed bias	2.2	2.2	meg
Cathode bias	2.2		meg

AVERAGE CHARACTERISTICS

	Oscillator Section 1	Amplifier Section 2		
Plate voltage	250	150	250	volts
Control-grid voltage	—8	0§	—9.5	volts
Plate resistance (approx.)	9000		2000	ohms
Transconductance	2500		7700	μmhos
Amplification factor	22.5		15.4	
Plate current	8.0		41	ma
Grid 1 voltage (approx.) for I_b=10μa	—18			volts
Grid 1 voltage (approx.) for I_b=50μa			—23	volts

NOTES:

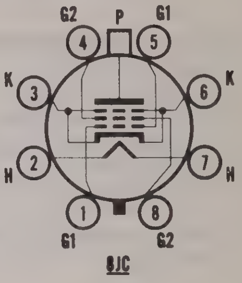
†Voltage pulse duration must not exceed 2500μs in a 525-line, 30-frame system.

‡Tube protection is needed for no-drive conditions if grid-resistor bias is used.

§Applied for short interval (2 secs. maximum) so as not to damage tube.

CBS 6DQ5

Horizontal deflection amplifier for color television receivers



Voltage, a-c or d-c	6.3	volts
Current	2.5	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.5	μμf
Input: g1 to k + h + g2 + g3	23	μμf
Output: p to k + h + g2 + g3	11	μμf

MAXIMUM RATINGS (Design center values unless noted)

Horizontal Deflection Amplifier*

Plate supply voltage, d-c (boost + d-c power supply)	900	volts
Plate voltage, peak pos. (absolute max.)	7000	volts
Plate voltage, peak negative pulse	1500	volts
Grid 2 voltage, d-c	175	volts
Grid 1 voltage, peak negative	200	volts
Plate dissipation†	24	watts
Grid 2 dissipation	3.2	watts
Cathode current, average	285	ma
Cathode current, peak	1000	ma
Grid 1 circuit resistance, self bias†	0.47	meg
Bulb temperature at hottest point	240	°C

AVERAGE CHARACTERISTICS

	Instantaneous Values			
Plate voltage	70	125	175	volts
Grid 2 (screen) voltage	125	125	175	volts
Grid 1 (control-grid) voltage	0	—25	—25	volts
Plate resistance (approx.)			5,500	ohms
Transconductance			10,500	μmhos
Plate current	550		110	ma
Grid 2 current	42		5	ma
Grid 1 voltage (approx.) for I_b=1ma			—55	volts
Grid 2 to grid 1 amplification factor		3.3		

NOTES:

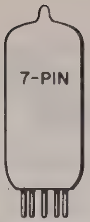
*Voltage pulse duration must not exceed 10μs in a 525-line, 30-frame system.

†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

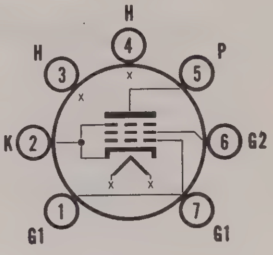
6DR7 (See chart)

CBS

6DS5



Beam power amplifier for radio and TV, high output with low plate voltage



7BZ

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	0.8	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	90	volts
Heater positive to cathode	90	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.19	μμf
Input: g1 to k + h + g2 + b.p.	9.5	μμf
Output: p to k + h + g2 + b.p.	6.3	μμf

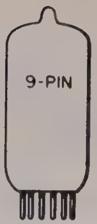
MAXIMUM RATINGS (Design center values)

Plate voltage	250	volts
Grid 2 voltage	250	volts
Grid voltage, peak positive	0	volts
Plate dissipation	8.0	watts
Grid 2 dissipation	2.0	watts
Grid circuit resistance		
Fixed bias	0.1	meg
Cathode bias	1.0	meg
Bulb temperature at hottest point	250	°C

CHARACTERISTICS AND TYPICAL OPERATION

	Fixed Bias		Cathode Bias		
Plate supply voltage	200	250	200	250	volts
Grid 2 (screen) voltage	200	200	200	200	volts
Grid 1 (control-grid) voltage	—7.5	—8.5			volts
Cathode bias resistor			180	270	ohms
Plate resistance (approx.)	28,000	28,000	28,000	28,000	ohms
Transconductance	6,000	5,800	6,000	5,800	μmhos
Grid 1 input, peak a-f	7.5	8.5	7.5	9.2	volts
Plate current, zero signal	35	29	34.5	27	ma
Plate current, max. signal	36	32	32.5	25	ma
Grid 2 current, zero signal	3	3	3.5	3	ma
Grid 2 current, max. signal	9	10	9	9	ma
Load resistance impedance	6,000	8,000	6,000	8,000	ohms
Total harmonic distortion	9	10	10	10	%
Power output, max. signal	3	3.8	2.8	3.6	watts

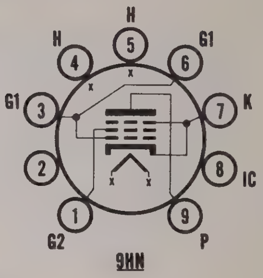
CBS 6DT5



Vertical deflection amplifier for television receivers employing a 110° picture tube

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.2	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode	200	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.57	μμf
Input: g1 to k + h + g2 + b.p.	12.5	μμf
Output: p to k + h + g2 + b.p.	4.9	μμf

MAXIMUM RATINGS (Design maximum values unless noted)

Vertical Deflection Amplifier*

Plate voltage	315	volts
Plate voltage, peak pos. (absolute max.)	2200	volts
Grid 2 voltage, d-c	285	volts
Grid 1 voltage, peak negative	–250	volts
Plate dissipation†	9.0	watts
Grid 2 dissipation	2.0	watts
Cathode current, average	55	ma
Cathode current, peak	190	ma
Grid 1 circuit resistance		
Fixed bias	0.5	meg
Cathode bias	1.0	meg

AVERAGE CHARACTERISTICS

	Instantaneous Values§			
Plate voltage	60	75	250	volts
Grid 2 (screen) voltage	150	250	250	volts
Grid 1 (control-grid) voltage	0	0	–16.5	volts
Transconductance			6200	μmhos
Plate current	100	180‡	38	ma
Grid 2 current	15	35‡	2.0	ma
Grid 1 voltage (approx.) for I_b=100μa			–35	volts

NOTES:

*Voltage pulse duration must not exceed 2500μs in a 525-line, 30-frame system.

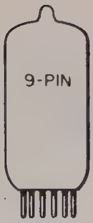
†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

‡Measured with a re-current waveform to keep plate and grid 2 dissipation within ratings.

§Applied for a maximum of 2 seconds.

6DT8 · 6DW5 · 6DZ8 (See chart)

CBS 6EA8



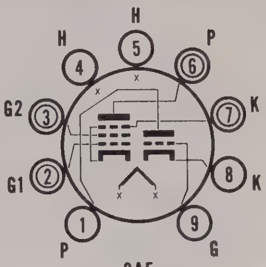
Vhf oscillator and mixer, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450±6%	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 100 volts max.



9AE

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section	**Shield◆**	**No Shield**	
Grid to plate: g1 to p	1.7	1.7	μμf
Input: g1 to k + h	3.2	3.0	μμf
Output: p to k + h	1.1	0.3	μμf
Heater to cathode, each section▼	3.0	3.0	μμf
Pentode Section			
Grid to plate: g1 to p, max.	0.01	0.02	μμf
Input: g1 to k + h + g2+ g3	5.0	5.0	μμf
Output: p to k + h + g2 + g3	3.4	2.6	μμf

◆JETEC shield 315 connected to cathode unless noted otherwise.
▼JETEC shield 315 connected to ground.

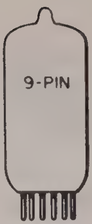
MAXIMUM RATINGS (Design maximum values)

	Triode	**Pentode**	
Plate voltage	330	330	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		330	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	3.0	3.1	watts
Grid 2 dissipation		0.55	watts

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	**Triode**	**Pentode**	
Plate voltage	150	125	volts
Grid 2 (screen) voltage		125	volts
Grid 1 (control-grid) voltage		−1.0	volts
Cathode-bias resistor	56		ohms
Plate resistance (approx.)	5000	80,000	ohms
Transconductance	8500	6,400	μmhos
Amplification factor	40		
Plate current	18	12	ma
Grid 2 current		4.0	ma
Grid 1 voltage (approx.) for I_b=10μa	−12	−9	volts

CBS 6EB8



Class A amplifier • sync separator • sync clipper • video amplifier • pentode mixer

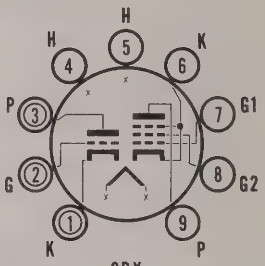
HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	750	ma
Peak heater-cathode voltage, max.†		
Heater neg. to cathode	200	volts
Heater pos. to cathode	200	volts
Warm-up time	11 sec. average	

(See Series-String Heaters section of the Handbook APPENDIX)

†Design maximum values.

★D-c component must not exceed 100 volts max.



9DX

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section

Grid to plate: g1 to p	4.4	μμf
Input: g1 to k + h	2.4	μμf
Output: p to k + h	0.36	μμf

Pentode Section

Grid to plate: g1 to p, max.	0.1	μμf
Input: g1 to k + h + g2 + g3 + I.S.	11	μμf
Output: p to k + h + g2 + g3 + I.S.	4.2	μμf
Coupling: pentode grid 1 to triode plate, max.	.005	μμf
Coupling: pentode plate to triode grid, max.	.018	μμf
Coupling: pentode plate to triode plate, max.	0.17	μμf

MAXIMUM RATINGS (Design maximum values)

	Triode	Pentode	
Plate voltage	330	330	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		330	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	1.0	5.0	watts
Grid 2 dissipation		1.1	watts
Grid 1 circuit resistance			
Fixed bias	0.5	0.25	meg
Cathode bias	1.0	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

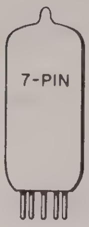
Plate voltage	250	200	volts
Grid 2 (screen) voltage		125	volts
Grid 1 (control-grid) voltage	−2		volts
Cathode-bias resistor		68	ohms
Plate resistance (approx.)	37,000	75,000	meg
Transconductance	2,700	12,500	μmhos
Amplification factor	100		
Plate current	2	25	ma
Grid 2 current		7.0	ma
Grid 1 voltage (approx.) for $I_b = 100$ μa		−9	volts
Grid 1 voltage (approx.) for $I_b = 20$ μa	−5		volts

PLATE KNEE CHARACTERISTICS (Instantaneous Values)

Plate voltage	45	volts
Grid 2 voltage	125	volts
Grid 1 voltage	0	volts
Plate current	40	ma
Grid 2 current	15	ma

6EF6 (See chart)

CBS 6EH5

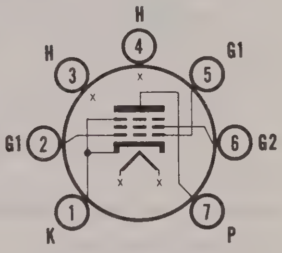


General-purpose power amplifier for radio, TV, and phonographs

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	1.2	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts

★D-c component must not exceed 100 volts max.



7CV

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.65	μμf
Input: g1 to k + h + g2 + g3	17	μμf
Output: p to k + h + g2 + g3	9	μμf

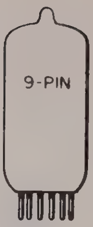
MAXIMUM RATINGS (**Design center values**)

Plate voltage	135	volts
Grid 2 voltage	117	volts
Grid voltage, peak positive	0	volts
Plate dissipation	5	watts
Grid 2 dissipation	1.75	watts
Grid circuit resistance		
Fixed bias	0.1	meg
Cathode bias	0.5	meg
Bulb temperature at hottest point	220	°C

CHARACTERISTICS AND TYPICAL OPERATION

Plate supply voltage	110	volts
Grid 2 (screen) supply voltage	115	volts
Cathode bias resistor	62	ohms
Plate resistance (approx.)	11,000	ohms
Transconductance	14,600	μmhos
Grid 1 input voltage, peak a-f	3	volts
Plate current, zero signal	42	ma
Plate current, maximum signal	42	ma
Grid 2 current, zero signal	11.5	ma
Grid 2 current, maximum signal	14.5	ma
Load resistance impedance	3000	ohms
Total harmonic distortion (approx.)	7	%
Power output, maximum signal	1.4	watts

CBS 6EH8



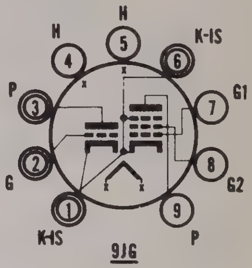
Vhf oscillator and mixer, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	6.3	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Triode Section	Shield◆	No Shield	
Grid to plate: g1 to p	1.8	1.8	μμf
Input: g1 to k + h + Pk + Pg3 + i.s.	2.8	2.8	μμf
Output: p to k + h + Pk + Pg3 + i.s.	2.2	1.7	μμf
Pentode Section			
Grid to plate: g1 to p, max.	.012	.020	μμf
Input: g1 to k + h + g2 + g3 + Tk + i.s.	4.8	4.8	μμf
Output: p to k + h + g2 + g3 + Tk + i.s.	3.2	2.4	μμf
Cathode to heater: h to Tk + Pk + Pg1 + Pg3 + i.s.	8.5	8.5	μμf

◆JETEC shield 315 connected to cathode.

MAXIMUM RATINGS (Design maximum values)

	Triode	Pentode	
Plate voltage	300	300	volts
Grid 2 voltage	See Rating Chart in APPENDIX		
Grid 2 supply voltage		300	volts
Grid 1 voltage, positive d-c	0	0	volts
Plate dissipation	2.5	2.8	watts
Grid 2 dissipation		0.5	watts
Grid 1 circuit resistance			
Fixed bias	0.5	0.25	meg
Self bias	1.0	1.0	meg

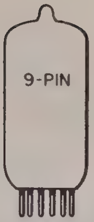
CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier	Triode	Pentode		
Plate voltage	125	100	125	volts
Grid 2 (screen) voltage		70	125	volts
Grid 1 (control-grid) voltage	−1.0	0	−1.0	volts
Plate resistance (approx.)			0.17	meg
Transconductance	7500	6500	6000	μmhos
Amplification factor	40			
Plate current	13.5		12.0	ma
Grid 2 current			4.0	ma
Grid 1 voltage (approx.) for I_b=20μa	−9			volts

6EW6 · 6FH6 · 7EY6 (See chart)

CBS

8AW8A



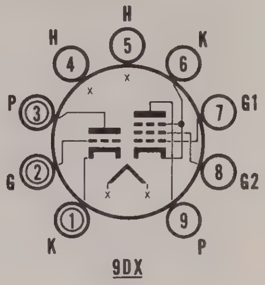
Combined sync separator and video amplifier, heater warm-up controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	8.4	volts
Current	450	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11	secs. average

(See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 100 volts max.

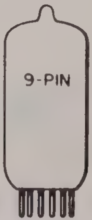


Except for heater ratings, the 8AW8A is identical to the 6AW8 and 6AW8A. See type 6AW8 for other data.

8BN8 (See chart)

CBS

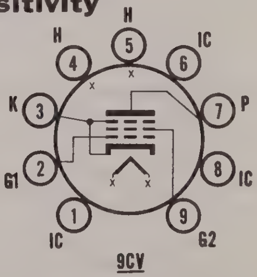
8BQ5



Hi-Fi power amplifier with high power output and high power sensitivity

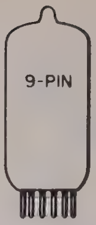
HEATER CHARACTERISTICS

Voltage, a-c or d-c	8.0±0.7	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	volts
Heater positive to cathode	100	volts

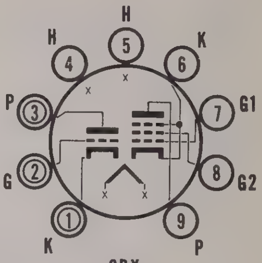


Except for heater ratings, type 8BQ5 is identical to 6BQ5. For further data refer to the 6BQ5.

CBS 8CX8



Combined sync amplifier, sync separator, or sync clipper, etc., and video or i-f amplifier



9DX

HEATER CHARACTERISTICS

Voltage, a-c or d-c	8.0 volts
Current	600 ma
Peak heater-cathode voltage, max.	
Heater negative to cathode	200 volts
Heater positive to cathode★	200 volts
Warm-up time	11 secs. average

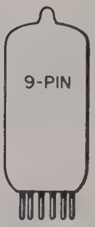
(See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 100 volts max.

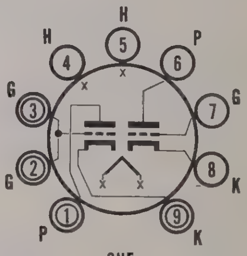
Except for heater ratings, 8CX8 is identical to 6CX8. Refer to type 6CX8 for other data.

8CY7 · 9DZ8 · 9EF6 (See chart)

CBS 10DE7



Television vertical deflection amplifier and oscillator



9HF

HEATER CHARACTERISTICS

Voltage, a-c or d-c	9.7 volts
Current	600 ma
Peak heater-cathode voltage, max.	
Heater negative to cathode	200 volts
Heater positive to cathode★	200 volts

★D-c component must not exceed 100 volts max.

Type 10DE7 is identical to type 6DE7 except for heater characteristics. Refer to the 6DE7 for other data.

CBS

11CY7

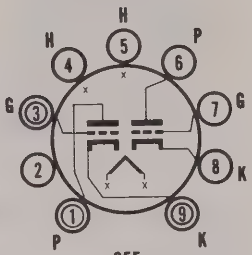
Dissimilar duotriode for TV deflection oscillator and amplifier applications

HEATER CHARACTERISTICS

Voltage, a-c or d-c	11.0 volts
Current	450±6% ma
Peak heater-cathode voltage, max.	
Heater negative to cathode	200 volts
Heater positive to cathode★	200 volts
Warm-up time	11 secs. average

(See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 100 volts max.



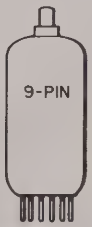
9EF

Type 11CY7 is identical to type 6CY7 except for heater characteristics. See type 6CY7 for other data.

12AD7 (See chart)

CBS

12AF3



Damper diode for television horizontal sweep circuits, warm-up controlled for series-strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6 volts
Current	600 ma
Peak heater-cathode voltage, max.*†	
Heater negative to cathode♦	4500 volts
Heater positive to cathode★	300 volts
Warm-up time	11 secs. average

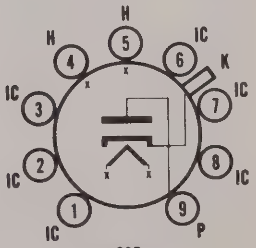
(See Series-String Heaters section of Handbook APPENDIX)

*Voltage pulse duration must not exceed 10μs in a 525-line, 30-frame system.

†Design maximum value.

♦D-c component must not exceed 1000 volts max.

★D-c component must not exceed 100 volts max.

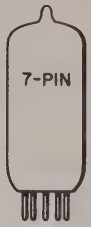


9CB

Type 12AF3 is identical to type 6AF3 except for heater characteristics. Refer to 6AF3 for additional data.

12AG6 · 12BW4 (See chart)

CBS 12CU5



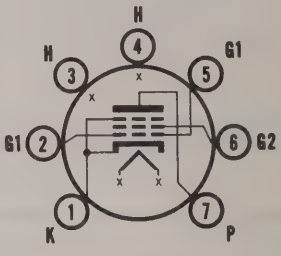
Audio output for television receivers with low plate supply voltage

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	600	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode	200	volts

★D-c component must not exceed 100 volts max.

Warm-up time...... 11 secs. average (See Series-String Heaters section of APPENDIX in CBS Tube Manual.)



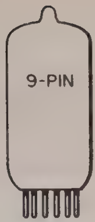
7CV

Type 12CU5 is identical to type 6CU5 except for heater characteristics.

12DE8 · 12DF7 · 12DK7 (See chart)

CBS

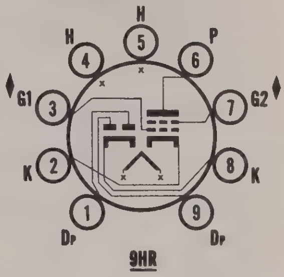
12DL8



Combined detector and space-charge amplifier for 12-volt A and B supply automobile radios

HEATER CHARACTERISTICS

Voltage, a-c or d-c*	12.6	volts
Current	550	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Tetrode Section

Grid to plate: g2 to p	14	μμf
Input: g2 to g1 + k + h	12	μμf
Output: p to g1 + k + h	1.3	μμf

Diode Section

Diode 1 input (p to k + h)	1.6	μμf
Diode 2 input (p to k + h)	1.6	μμf
Diode 1 to diode 2	0.03	μμf
Coupling: (Diode 1 plate to tetrode grid 2, max.)	0.02	μμf
(Diode 2 plate to tetrode grid 2 max.)	0.006	μμf

MAXIMUM RATINGS (Design center values except as noted)

Plate voltage	30	volts
Grid 1 voltage, positive (absolute maximum)	16	volts
Grid 2 voltage, negative	−20	volts
Grid 2 circuit resistance	10	meg
Average diode current	5	ma

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	12.6	12.6	volts
Grid 2 (control grid) voltage	−0.5†	−2.0▲	volts
Grid 1 (space-charge grid) voltage	12.6	12.6	volts
Amplification factor (grid 2 to plate)	7.2		ohms
Plate resistance	480		ohms
Transconductance (grid 2 to plate)	15,000		μmhos
Grid 2 input voltage, peak a-f		2.5	volts
A-f signal source resistance		100,000	ohms
Plate current	40	8.0	ma
Grid 1 (space-charge grid) current	75	75	ma
Load resistance impedance		800	ohms
Total harmonic distortion (approx.)		10	
Power output, maximum signal		40	mw
Diode units (two), diode current with 10.0 volts applied (each diode)		3	ma

NOTES:

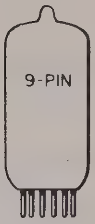
*Type 12DL8 is intended for use in automobile radios operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10.0 volts to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variation encountered in this type of supply.

†Average bias developed across a 2.2 meg. resistor.

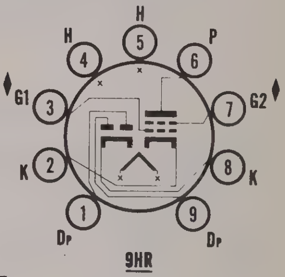
▲Measured across a 2.2 meg. resistor by grid 2 rectification with a zero plate signal equal to approximately 40 ma.

♦Grid 1 space-charge grid. Grid 2 control-grid.

CBS 12DV8



Combined detector, AVC rectifier and transistor driver for 12-volt system automobile radios



HEATER CHARACTERISTICS

Voltage, a-c or d-c★	12.6	volts
Current	375	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	16	volts
Heater positive to cathode	16	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Tetrode grid to plate: g1 to p	12	μμf
Tetrode input: g1 to Tk + h + g2	9.0	μμf
Tetrode output: p to Tk + h + g2	1.0	μμf
Tetrode g2 to any diode plate, max.	0.015	μμf
Diode 1 input	1.7	μμf
Diode 2 input	1.6	μμf
Diode 1 plate to diode 2 plate, max.	0.10	μμf

MAXIMUM RATINGS (Design maximum values)

Plate voltage	16	volts
Negative control-grid voltage	16	volts
Control-grid circuit resistance	10	meg
Diode current for continuous operation, each diode	5	ma

CHARACTERISTICS AND TYPICAL OPERATION

	Characteristics	Class A	
Plate voltage	12.6	12.6	volts
Cathode resistor	18	18	ohms
Control grid resistor	4.7	4.7	meg
Space-charge-grid voltage	12.6	12.6	volts
Space-charge-grid current	53	54	ma
Amplification factor†	7.6		
Plate resistance (approx.)	900		ohms
Transconductance†	8500		μmhos
Plate current	9.0		ma
Peak AF control-grid voltage		1.2	volts
AF signal source resistance		300,000	ohms
Maximum signal plate current		6.8	ma
Load resistance		1250	ohms
Total harmonic distortion (approx.)		3	%
Power output		5	mw
Average diode current, each diode with 10 volts d-c applied	3.0		ma

NOTE:

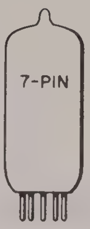
★This tube is intended for automotive radios operated from a nominal 12-volt battery. Design of the tube will allow heater to operate satisfactorily over the range from 10.0 volts to 15.9 volts. The maximum ratings of this tube provide an adequate safety factor for the wide variations encountered in automotive supply voltages.

†Control grid to plate.

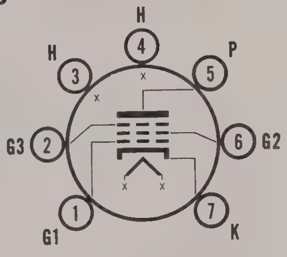
♦Grid 1 space-charge grid. Grid 2 control grid.

12DW5 • 12DY8 (See chart)

CBS 12DZ6



I-f amplifier for 12-volt A and B supply automobile radios



7BK

HEATER CHARACTERISTICS

Voltage, a-c or d-c★	12.6	volts
Current	190	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	16	volts
Heater positive to cathode	16	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Unshielded	
Grid to plate: g1 to p, max.	0.15	μμf
Input: g1 to k + h + g2 + g3	9.5	μμf
Output: p to k + h + g2 + g3	4.0	μμf

MAXIMUM RATINGS (Design maximum values)

Plate voltage	16	volts
Grid 2 voltage	16	volts
Grid 1 voltage, positive d-c	0	volts
Grid 1 circuit resistance	12	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	12.6	volts
Grid 3 (suppressor)	connect to cathode at socket	
Grid 2 (screen) voltage	12.6	volts
Grid 1 Resistor (Bypassed)	10.0	meg
Plate resistance (approx.)	30,000	ohms
Transconductance	3,600	μmhos
Plate current	5.3	ma
Grid 2 current	2.6	ma
Grid 1 voltage (approx.) for $g_m = 10 \mu$mhos	—19	volts

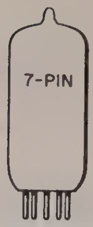
NOTE:

★This tube is intended for automotive radios operated from a nominal 12-volt battery. Design of the tube will allow heater to operate satisfactorily over the range from 10.0 volts to 15.9 volts. The maximum ratings of this tube provide an adequate safety factor for the wide variations encountered in automotive supply voltages.

12DZ8 (See chart)

CBS

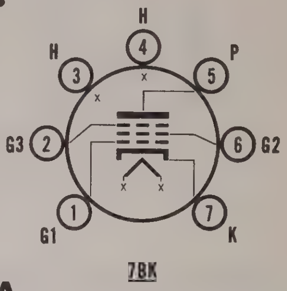
12EA6



I-f amplifier for 12-volt A and B supply automobile radios

HEATER CHARACTERISTICS

Voltage, a-c or d-c★	12.6	volts
Current	175	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	16	volts
Heater positive to cathode	16	volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Unshielded	
Grid to plate: g1 to p, max.	0.04	μμf
Input: g1 to k + h + g2 + g3	11	μμf
Output: p to k + h + g2 + g3	4.0	μμf

MAXIMUM RATINGS (Design maximum values)

Plate voltage	16	volts
Grid 2 voltage	16	volts
Grid 1 voltage, positive d-c	0	volts
Grid 1 circuit resistance	12	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	12.6	volts
Grid 3 (suppressor)	connect to cathode at socket	
Grid 2 (screen) voltage	12.6	volts
Grid 1 resistor (bypassed)	10	meg
Plate resistance (approx.)	32,000	ohms
Transconductance	3,800	μmhos
Plate current	3.2	ma
Grid 2 current	1.4	ma
Grid 1 voltage (approx.) for $I_b = 10\mu a$	−3.4	volts

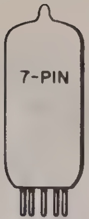
NOTE:

★This tube is intended for automotive radios operated from a nominal 12-volt battery. Design of the tube will allow the heater to operate satisfactorily over the range from 10.0 volts to 15.9 volts. The maximum ratings of this tube provide an adequate safety factor for the wide variations encountered in automotive supply voltages.

12EC8 • 12EF6 (See chart)

CBS

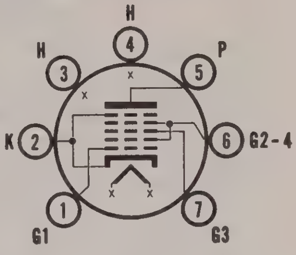
12EG6



Dual control r-f amplifier for 12-volt A and B supply automobile radios

HEATER CHARACTERISTICS

Voltage, a-c or d-c★	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts



7CH

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—With Shield♦

Grid 3 to plate: g3 to p, max.	0.25	μμf
Grid 3 input: g3 to all others	6.5	μμf
Output: p to all others	12	μμf
Grid 1 input: g1 to all except p	5.7	μμf
Grid 1 to cathode: g1 to k + g5	3.2	μμf
Grid 1 to plate: g1 to p, max.	0.04	μμf
Grid 1 to Grid 3: g1 to g3, max.	0.15	μμf

♦External shield JTEC 316 connected to pin 2.

MAXIMUM RATINGS (Design center values)

Plate voltage	30	volts
Grid 2 and 4 voltage	30	volts
Grid 2 and 4 supply voltage	30	volts
Grid 3 voltage, negative d-c	30	volts
Grid 3 voltage, positive d-c	0	volts
Grid 3 circuit resistance	10	meg
Cathode current, total	20	ma

CHARACTERISTICS AND TYPICAL OPERATION

Heptode Connected

Plate voltage	12.6	volts
Grid 3 (signal grid) voltage	—0.8†	volts
Grid 2 and 4 (oscillator anode) voltage	12.6	volts
Grid 1 (oscillator grid) voltage	—0.8‡	volts
Plate resistance (approx.)	0.15	meg
Transconductance, grid 3 to plate	800	μmhos
Plate current	0.4	ma
Grid 2 and 4 (oscillator anode) current	2.4	ma
Grid 1 voltage and grid 3 voltage† (approx.) for $g_m = 10$μmhos	—3.0	volts

NOTES:

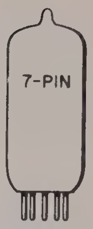
†Provided by grid 1 voltage through a suitable grid 3 resistor.

‡Average bias developed across a 2.2 megohm resistor.

★This tube is intended for automotive radios operated from a nominal 12-volt battery. Design of the tube will allow the heater to operate satisfactorily over the range from 10.0 volts to 15.9 volts. The maximum ratings of this tube provide an adequate safety factor for the wide variations encountered in automotive supply voltages.

CBS

12EH5



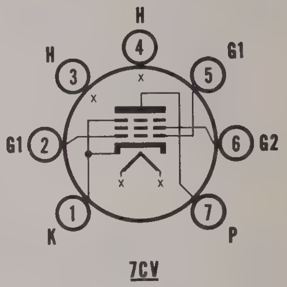
General-purpose power amplifier for radio, TV, and phonographs

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6 volts
Current	0.6 amp
Peak heater-cathode voltage, max.	
Heater negative with respect to cathode	300 volts
Heater positive with respect to cathode★	200 volts
Warm-up time	11 sec. average

(See Series-String Heaters section of the Handbook APPENDIX)

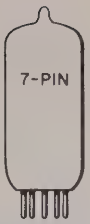
★D-c component must not exceed 100 volts max.



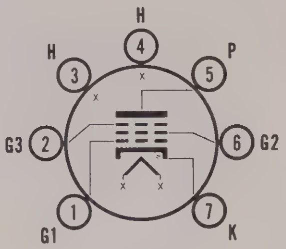
Type 12EH5 is identical to types 6EH5, 25EH5, and 50EH5 except for heater characteristics. See type 6EH5 for other data.

CBS

12EK6



Sharp cutoff pentode voltage amplifier for VHF rf-if service



7BK

HEATER CHARACTERISTICS

Voltage, a-c or d-c★	12.6	volts
Current	190	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	16	volts
Heater positive to cathode	16	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p, max.	0.032	µµf
Input: g1 to k + h + g2 + g3	10	µµf
Output: p to k + h + g2 + g3	5.5	µµf

MAXIMUM RATINGS (Design maximum values)

Plate voltage	16	volts
Grid 2 voltage	16	volts
Grid 1 voltage, positive d-c	0	volts
Grid 1 circuit resistance	10	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

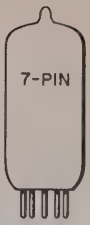
Plate voltage	12.6	volts
Grid 3 (suppressor)	connect to cathode at socket	
Grid 1 voltage†		
Grid 2 (screen) voltage	12.6	volts
Grid 1 resistor	2.2	meg
Plate resistance (approx.)	40,000	meg
Transconductance	4,200	µmhos
Plate current	4.4	ma
Grid 2 current	2	ma
Grid 1 voltage (approx.) for $I_b=10\mu a$	—4	volts

NOTES:

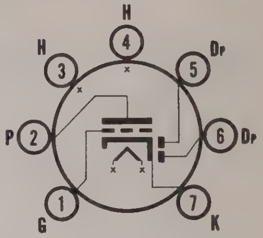
†Average contact potential developed across specified resistance.

★This tube is intended for automotive radios operated from a nominal 12-volt battery. Design of the tube will allow the heater to operate satisfactorily over the range from 10.0 volts to 15.9 volts. The maximum ratings of this tube provide an adequate safety factor for the wide variations encountered in automotive supply voltages.

CBS 12EL6



Combined detector—a-f voltage amplifier for 12-volt A and B supply automobile radios



7FB

HEATER CHARACTERISTICS

Voltage, a-c or d-c*	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES—Unshielded

Grid to plate: g1 to p	1.8	μμf
Input: g1 to h + k	2.2	μμf
Output: p to h + k	1.0	μμf
Diode 1 to diode 2	1.0	μμf

MAXIMUM RATINGS (Design center values)

Plate voltage	30	volts
Cathode current	20	ma
Control grid circuit resistance	10	meg
Diode current, average	1.0	ma

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	12.6	volts
Control grid voltage	0	volts
Plate current	750	μa
Transconductance	1200	μmhos
Amplification factor	55	
Plate resistance, (approx.)	45,000	ohms
Average diode current with 10 volts d-c applied (each diode)†	2.0	ma

Resistance Coupled Amplifier

Plate supply voltage	12.6	volts
Control grid voltage‡	0	volts
Plate load resistor	1.0	meg
Control grid resistor	1.0	meg
Input capacitor	0.02	μμf
Output capacitor	0.01	μμf
Grid resistor of following stage	2.0	meg
Voltage gain at 400 cps (measured at an output voltage of 1 volt, rms)	16	volts

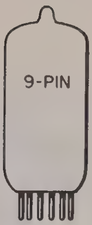
NOTES:

*Type 12EL6 is intended for use in automobile radios operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10 volts to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variation encountered in this type of supply.

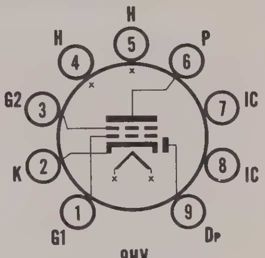
†Test condition only.

‡Contact potential developed across specified grid resistor.

CBS 12EM6



Combined detector—a-f voltage amplifier for 12-volt A and B supply automobile radios



9HV

HEATER CHARACTERISTICS

Voltage, a-c or d-c*	12.6	volts
Current	500	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts

ELECTRICAL DATA

MAXIMUM RATINGS (Design center values)

Plate voltage	30	volts
Grid 2 voltage	30	volts
Plate dissipation	0.5	watts
Grid 1 circuit resistance	15	meg
Detector plate current	10	ma

CHARACTERISTICS AND TYPICAL OPERATION

Plate voltage	12.6	volts
Grid 2 (screen) voltage	12.6	volts
Grid 1 resistor (bypassed)	2.2	meg
Plate resistance	4000	ohms
Transconductance	5000	μmhos
Plate current	6.0	ma
Grid 2 current	1.0	ma
Diode current with 10 volts applied	1.0	ma

Class A Amplifier

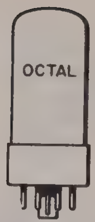
Plate voltage	12.6	volts
Grid 2 voltage	12.6	volts
Grid 1 voltage♦	0	volts
A-f signal source resistance	200,000	ohms
A-f grid voltage, rms	1.0	volts
Load resistance	3500	ohms
Plate current	2.5	ma
Power output	10	mw
Total harmonic distortion	10	%

NOTES:

*Type 12EM6 is intended for automotive radios operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10.0 volts to 15.9 volts and that the maximum ratings provide a safety factor for the wide voltage variation encountered in this type of supply.

♦Obtained by grid 1 rectification with a 15 megohm resistor. The zero signal plate current is approximately 6.0 ma.

CBS 12EN6



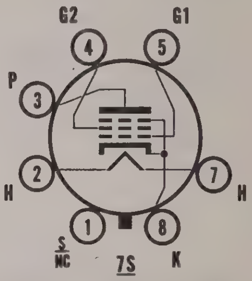
Vertical deflection amplifier for television receivers, heater warm-up time controlled for series strings

HEATER CHARACTERISTICS

Voltage, a-c or d-c	12.6	volts
Current	0.6±6%	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode	200	volts
Heater positive to cathode★	200	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of Handbook APPENDIX)

★D-c component must not exceed 100 volts max.



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

Grid to plate: g1 to p	0.65	μμf
Input: g1 to k + h + g2 + b.p.	14	μμf
Output: p to k + h + g2 + b.p.	8.0	μμf

MAXIMUM RATINGS (Design maximum values)

Vertical Deflection Amplifier*

	Triode♦ Connection	Pentode Connection	
Plate supply voltage, d-c	300	300	volts
Plate voltage, peak pos. (absolute max.)	1200	1200	volts
Grid 2 voltage, d-c		150	volts
Grid 1 voltage, peak negative	250	250	volts
Plate dissipation†	7.5	7.0	watts
Grid 2 dissipation		1.25	watts
Cathode current, average	50	50	ma
Cathode current, peak	175	175	ma
Grid 1 circuit resistance	2.2	2.2	meg

AVERAGE CHARACTERISTICS

	Instantaneous Values▼		
Plate voltage	50	200	volts
Grid 2 (screen) voltage	110	110	volts
Grid 1 (control-grid) voltage	0	—9.5	volts
Plate resistance (approx.)		28,000	ohms
Transconductance		8,000	μmhos
Grid 1 cutoff voltage (approx.)		—35	volts

NOTES:

*Voltage pulse duration must not exceed 2500μs in a 525-line, 30-frame system.

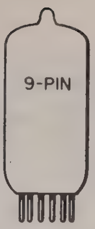
†Tube protection is needed for no-drive conditions if grid-resistor bias is used.

♦Grid 2 tied to plate.

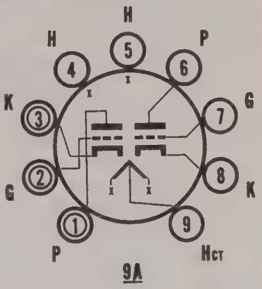
▼Applied for 2 seconds or less so as not to damage the tube.

12EZ6 · 12FA6 · 12FM6 · 12G8 (See chart)

CBS 12U7



General purpose duotriode amplifier for 12-volt A and B supply radios



HEATER CHARACTERISTICS

Voltage*	12.6	volts
Current	150	ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	30	volts
Heater positive to cathode	30	volts

ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES

	Section 1		Section 2		
	No Shield	Shield♦	No Shield	Shield♦	
Grid to plate: g1 to p	1.5	1.5	1.5	1.5	μμf
Input g1 to h + k	1.6	1.8	1.6	1.8	μμf
Output: p to h + k	0.40	2.0	0.32	2.0	μμf

♦JETEC shield 315 connected to cathode.

MAXIMUM RATINGS (Design center value)

Plate voltage	30	volts
Cathode current	15	ma
Control grid circuit resistance		
Fixed bias	0.25	meg
Cathode bias	1.0	meg

CHARACTERISTICS AND TYPICAL OPERATION

Class A Amplifier

Plate voltage	12.6	volts
Grid voltage	0	volts
Plate resistance (approx.)	12,500	ohms
Transconductance	1600	μmhos
Amplification factor	20	
Plate current	1.0	ma
Grid 1 voltage (approx.) for I_b = 10 μa	−1.5	volts

NOTE:

*Type 12U7 is intended for use in automobile radios operated from a nominal 12-volt battery. Design of the tube is such that the heater will operate satisfactorily over the range from 10 to 15.9 volts, and that the maximum ratings provide a safety factor for the wide voltage variations encountered in this type of supply.

13DR7 (See chart)

CBS 17AX4GT

Damper diode for television horizontal sweep circuit

HEATER CHARACTERISTICS

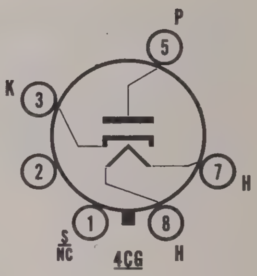
Voltage, a-c or d-c	16.8	volts
Current	450	ma
Peak heater-cathode voltage, max.*		
Heater negative to cathode†♦	4400	volts
Heater positive to cathode★	300	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

♦D-c component must not exceed 900 volts max.

★D-c component must not exceed 100 volts max.

†Absolute maximum value



Type 17AX4GT is identical to types 6AX4GT, 12AX4GT, and 25AX4GT except for heater characteristics. See type 6AX4GT for ratings and operating characteristics.

NOTE:

*Voltage pulse duration must not exceed 10 μs in a 525-line, 30 frame system.

17BQ6GT · 17C5 (See chart)

CBS 17D4

TV damper diode for horizontal deflection circuits, heater warm-up time controlled for series-string circuits

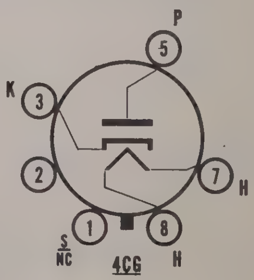
HEATER CHARACTERISTICS

Voltage*	16.8	volts
Current	0.45	amp
Peak heater-cathode voltage, max.		
Heater negative to cathode†♦	4400	volts
Heater positive to cathode★	300	volts
Warm-up time	11 secs. average	

(See Series-String Heaters section of APPENDIX in CBS Tube Manual).

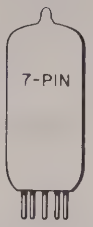
♦D-c component must not exceed 900 volts max.

★D-c component must not exceed 100 volts max.



Type 17D4 is identical to type 12D4 except for heater characteristics. Refer to 12D4 for other data.

CBS 25EH5

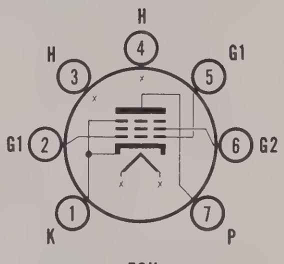


General-purpose power amplifier for radio, TV, and phonographs

HEATER CHARACTERISTICS

Voltage, a-c or d-c	25 volts
Current	0.3 amp
Peak heater-cathode voltage, max.	
Heater negative with respect to cathode	200 volts
Heater positive with respect to cathode★	200 volts

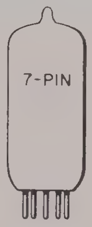
★D-c component must not exceed 100 volts max.



7CV

Type 25EH5 is identical to types 6EH5, 12EH5, and 50EH5 except for heater characteristics. See type 6EH5 for other data.

CBS 50EH5

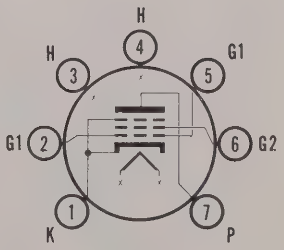


General-purpose power amplifier for radio, TV, and phonographs

HEATER CHARACTERISTICS

Voltage, a-c or d-c	50 volts
Current	0.15 amp
Peak heater-cathode voltage, max.	
Heater negative with respect to cathode	200 volts
Heater positive with respect to cathode★	200 volts

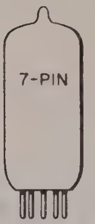
★D-c component must not exceed 100 volts max.



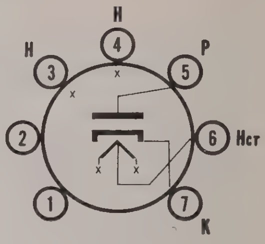
7CV

Type 50EH5 is identical to types 6EH5, 12EH5, and 25EH5 except for heater characteristics. See type 6EH5 for other data.

CBS 50DC4



Half-wave power rectifier for a-c/d-c equipment



5BQ

HEATER CHARACTERISTICS

Voltage, a-c or d-c*	50 volts
Tap Voltage*	7.5 volts
Current*	0.15 amp
Peak heater-cathode voltage, max.	
Heater negative to cathode	330 volts
Heater positive to cathode	330 volts

*Operation without panel lamp.

ELECTRICAL DATA

MAXIMUM RATINGS (Design maximum values)

Rectifier Service

Plate voltage, peak inverse	330 volts
Output current, d-c	
Without panel lamp	120 ma
With panel lamp and shunting resistor	110 ma
With panel lamp and no shunting resistor	70 ma
Plate current, peak steady state	0.72 amp
Heater tap voltage when panel lamp fails, rms	16.5 volts

CHARACTERISTIC

Tube Voltage Drop

Conducting 240 ma	21 volts

TYPICAL OPERATION

Half-wave Rectifier with Panel Lamp No. 40 or No. 47✢

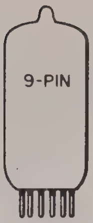
Heater voltage (pin 3 to pin 4)	45	45	45	45	volts
Heater-tap voltage (pin 4 to pin 6)	5.5	5.5	5.5	5.5	volts
Heater current between pins 3 and 6	150	150	150	150	ma
A-c plate supply voltage, rms	117	117	117	117	volts
Filter input capacitor	40	40	40	40	µf
Total effective plate-supply impedance	15	15	15	15	ohms
Panel lamp shunting resistor	450	200	100	75	ohms
D-c output current	70	80	90	100	ma

Half-wave Rectifier without Panel Lamp

Heater voltage (pin 3 to 4)	50 volts
Heater tap voltage (pin 4 to 6)	7.5 volts
Heater current between pins 3 and 4	150 ma
A-c plate supply voltage, rms	117 volts
Filter input capacitor	40 µf
Total effective plate supply impedance	15 ohms
D-c output current	110 ma
D-c output voltage at filter input, approx.	
For d-c output current of 55 ma	130 volts
For d-c output current of 110 ma	110 volts

✢Typical current same as for tube type 35W4.

CBS 7025

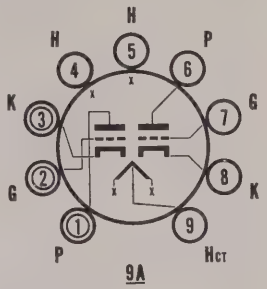


Low noise, low hum phase inverter or resistance-coupled audio amplifier

HEATER CHARACTERISTICS

	Series	Parallel	
Voltage, a-c or d-c	12.6	6.3	volts
Current	150	300	ma
Peak heater-cathode voltage, max.			
Heater negative to cathode	200	200	volts
Heater positive to cathode★ ...	200	200	volts

★D-c component must not exceed 100 volts max.



The 7025 is identical to type 12AX7 except for the low noise and hum voltage of the 7025 as shown in the measured values below:

EQUIVALENT NOISE AND HUM VOLTAGE

Referred to Grid, Each Unit

Average value, rms **1.8μvolts**

Conditions of measurement: Parallel heater connection, 6.3V a-c; grounded heater-transformer center-tap; E_{bb}=250V; R_L=10k; R_K=2700Ω, bypassed by 100μf; R_g=0; amplifier frequency range of 25 to 10,000 cps.

Maximum value, rms **7μvolts**

Conditions of measurement: same as for "average value" except R_K is unbypassed, R_g=50,000 ohms.

CBS

ADDITIONAL RECEIVING TUBES

	DESCRIPTION			CATHODE		MAXIMUM RATINGS§				SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION									
TYPE	CLASS★	BASING	BASE & PINS	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	CONTROL GRID VOLTS OR CATHODE RES.	PLATE MA.	SCREEN MA.	TRANSCONDUCTANCE µmhos	PLATE OR LOAD■ RESISTANCE (Ω)	AMP. FACTOR(µ)	MISCELLANEOUS & WATTS OUTPUT	TYPE
1AG4	P	1AG4	Submin.	1.25♦	.04	90	90			Power Amplifier	41.4	41.4	−3.6	2.4	0.6	1000	12,000■		35mW	**1AG4**
1AG5	D P	1AG5	Submin.	1.25♦	.03	50	50			Detector-Amplifier	45 22.5	45 22.5	−2 0	0.28 0.17	0.12 .043	250 235	2.5m 0.7m			**1AG5**
1AK4	P	1AK4	Submin.	1.25♦	.02					RF Amplifier	45 67.5	45 Note 1	0 0	0.75 0.75	0.2 0.2	750 750	1.5m 2.0m	(Note 1: 67.5 Volts Thru 0.11m Res.)		**1AK4**
1AK5	D P	1AG5	Submin.	1.25♦	.02					Detector-Amplifier	45	45	0	0.5	0.2	280	0.4m			**1AK5**
3B2	D	8GH	Octal	3.15	0.22	P.I.V.=25 kVdc Ib=1.1 mAdc				TV High Voltage Rectifier	135 volt tube drop at Ib=7ma.									**3B2**
4CE5	P	7BD	Min. 7	4.2●	.45	300	150	2	0.5	RF Amplifier	125	125	−1.0	11	2.8	7600	0.3m			**4CE5**
4EW6	P	7CM	Min. 7	4.2●	0.6	330†	165†	3.1†	0.65†	TV IF Amplifier	125	125	56Ω	11	3.2	14,000	0.2m		$Ec_3=0$	**4EW6**
5BS8	TR+TR	9AJ	Min. 9	5.6●	0.45	150		2		Class A Amplifier VHF Cascode Amplifier	150 250		220Ω −1.0	10 16		7200 10,000	5000 —	36 —		**5BS8**
5BZ7	TR+TR	9AJ	Min. 9	5.6●	0.45	250		2		Class A Amplifier (VHF Cascode Amplifier)	150		220Ω	10		6800	5300	36		**5BZ7**

5CL8A	TR TE	9FX	Min. 9	4.7●	0.6	300 300	— 150	2.7 2.8	— 0.5	Oscillator Mixer	125 125 100	— 125 100	56Ω −1.0 0	15 12 —	— 4.0 —	8000 6400 8200	5,000 0.1m —	40 — —		**5CL8A**
5CR8	TR P	9GJ	Min. 9	4.7●	0.6	330 330	— 165	2.75 2.3	— 0.55	TV IF Amplifier	125 125	— 125	−2 56Ω	12 13	— 3	4000 7700	5500 0.3m	22 —		**5CR8**
5EA8	TR P	9AE	Min. 9	4.7●	0.6	330† 330†	— 165†	3.0† 3.1†	— 0.55†	Oscillator Mixer	150 125	— 125	56Ω −1.0	18 12	— 4.0	8500 6400	5000 80,000	40 —		**5EA8**
5EH8	TR P	9JG	Min. 9	4.7●	0.6	300† 300†	— 150†	2.5† 2.8†	— 0.5†	VHF Oscillator Mixer	125 125 100	— 125 70	−1.0 −1.0 0	13.5 12 9	— 4.0 —	7500 6000 6500	— 0.17m ——	40 — —		**5EH8**
5R4GYA	D+D	5T	Octal	5.0	2.0	P.I.V.=2800 V				Full-Wave Rectifier	900 Volts RMS per plate, 150 Ma. D-C Output, Condenser Input Filter. 950 Volts RMS per plate, 175 Ma. D-C Output, Choke Input Filter.									**5R4GYA**
5V3	D+D	5T	Octal	5.0	3.8	P.I.V.=1400 V				Full-Wave Rectifier	425 Volts RMS per plate, 350 Ma. Output Current, Condenser Input Filter 500 Volts RMS per plate, 350 Ma. Output Current, Choke Input Filter.									**5V3**
6AN8A	TR P	9DA	Min. 9	6.3●	0.45	300 300	— 150	2.6 2.0	— 0.5	Oscillator Video Amplifier	200 200	150	−6 180Ω	13 9.5	— 2.8	3300 6200	5750 0.3m	19 —		**6AN8A**
6BW4	D+D	9DJ	Min. 9	6.3	0.9	P.I.V.=1275 V				Full-Wave Rectifier	325 V. RMS per plate, 100 Ma. Output Current, Condenser Input Filter. 450 V. RMS per plate, 100 Ma. Output Current, Choke Input Filter.									**6BW4**
6BX8	TR+TR	9AJ	Min.9	6.3	0.4	150	20	2 —		Class A Amplifier Cascode (VHF) Operation	65 125		−1.0 −0.5	9 11		6700 7500		25 —		**6BX8**
6BY4	TR	6BY4	—	6.3	0.25	300		1.1		Class A Amplifier UHF Amplifier	200 200		200Ω 200Ω	5 5		6000 —	16,700 —	100 —		**6BY4**
6BZ8	TR+TR	9AJ	Min. 9	6.3	0.4	250		2.2		Class A Amplifier Cascode RF Amplifier	125 250		100Ω −0.5	10 15		8000 10,000	5600 —	45 —		**6BZ8**
6CH7	TR+TR	9FC	Min. 9	6.3	0.4	250		2.0		Class A Amplifier (Cascode VHF Operation)	150		220Ω	10		6800	5300	36		**6CH7**
6CL5	P	8GD	Octal	6.3	2.5	700 DC 7000 Pk	200	25	4	Horizontal Deflection Amplifier	175 80	175 100	−40 0	90 280	7 20	6500 —	6000 —			**6CL5**

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D—Diode, D + D—Duodiode, H—Heptode, P—Pentode, TE—Tetrode, TR—Triode, TR1—Triode Section 1, TR2—Triode Section 2, TR + TR—Duotriode with identical sections.

♦ Directly heated cathode or filament.
● Warm-up time of 11 seconds (average) for use in series heater strings.
§ Design center values unless noted.
† Design maximum values.
■ Load resistance.
m Megohm.

Additional Receiving Tubes (continued)

	DESCRIPTION			CATHODE		MAXIMUM RATINGS§				SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION									
TYPE	CLASS★	BASING	BASE & PINS	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	CONTROL GRID VOLTS OR CATHODE RES.	PLATE MA.	SCREEN MA.	TRANSCONDUCTANCE µmhos	PLATE OR LOAD■ RESISTANCE (Ω)	AMP. FACTOR(µ)	MISCELLANEOUS & WATTS OUTPUT	TYPE
6CM8	TR P	9FZ	Min. 9	6.3●	0.45	300 300	— 150	1.0 2.0	— 0.5	Class A Amplifier Video Amplifier	250 200	— 150	−2 180Ω	1.8 9.5	— 2.8	2000 6200	50,000 0.6m	100 —		**6CM8**
6CR8	TR P	9GJ	Min. 9	6.3●	0.45	330† 330†	— 165†	2.75† 2.3†	— 0.55†	Class A Amplifier TV IF Amplifier	125 125	— 125	−2 56Ω	12 13	— 3	4000 7700	5500 0.3m	22 —		**6CR8**
6CS8	TR P	9FZ	Min. 9	6.3●	0.45	330† 330†	— 165†	2.75† 2.3†	— 0.55†	Class A Amplifier TV IF Amplifier	125 125	— 125	−2 56Ω	12 13	— 3	4000 7700	5500 0.3m	22 —		**6CS8**
6DG7	P	9BA	Min. 9	6.3	0.3	300	125	3	0.6	IF Amplifier	250 100	100 100	68Ω 68Ω	11 10.8	4.2 4.4	4400 4300	1m 0.25M		$Ec_3=0$ $Ec_3=0$	**6DG7**
6DR7	TR1 TR2	9HF	Min. 9	6.3	0.9	330† 275† 1500 PK		1.0† 7.0†		Vertical Deflection Osc. Vertical Deflection Ampl.	250 150		−3 −17.5	1.4 35		1600 6500	40,000 925	68 6		**6DR7**
6DT8	TR+TR	9DE	Min. 9	6.3	0.3	300		2.5		RF Amplifier & FM Tuner Osc-Mixer.	250 100		200Ω 270Ω	10 3.7		5500 4000	10,900 15,000	60 60		**6DT8**
6DW5	P	9CK	Min. 9	6.3	1.2	330† 2200 Pk	220†	11†	2.5†	Vertical Deflection Amplifier	200 60	150 150	−22.5 0	55 260	2 20	5500	15,000			**6DW5**
6DZ8	TR P	9EX	Min. 9	6.3	0.9	150 150	— 135	0.75 6.5	— 1.5	Audio Amplifier	120 145	— 120	1500Ω 180Ω	0.8 45	— 6	1400 7500	— 2500	100 —		**6DZ8**
6EF6	P	7S	Octal	6.3	0.9	250 2000 Pk	250	10	2	Vertical Deflection Amplifier	250 75	250 250	−18 0	50 170	2 17	5000 —				**6EF6**

6EW6	P	7CM	Min. 7	6.3	0.4	330†	165†	3.1†	0.65†	TV IF Amplifier	125	125	56Ω	11	3.2	14,000	0.2m		$E_{c3}=0$	**6EW6**
6FH6	P	6AM	Octal	6.3	1.2	770† 6000 Pk	220†	17†	3.6†	Horizontal Deflection Amplifier	250 60	150 150	−22.5 0	75 300	1.7 15	6000 —	12,000 —			**6FH6**
7EY6	P	7AC	Octal	7.2●	0.6	350† 2500 Pk	300†	11†	2.75†	Vertical-Deflection Amplifier	250 50	250 250	−17.5 0	44 153	3 21	4400 —	60000 —			**7EY6**
8BN8	D+D TR	9ER	Min. 9	8.4●	0.45	300		1.5		Detector (Each Diode) Triode Amplifier	(Ib=50mA at 10 Volts applied) (2.6 Volt Tube Drop at Ib=9mA.) 250 100		−3 −1	1.6 1.5		2500 3500	28,000 21,000	70 75		**8BN8**
8CY7	TR1 TR2	9EF	Min. 9	7.9●	0.6	350† 350† 1800 Pk		1.0† 5.5†		TV Vert. Defl.-Osc. (TR1) TV Vert. Defl. Ampl. (TR2)	250 60 150		−3 0 620Ω	1.2 80 30		1300 — 5400	52,000 — 920	68 — 5		**8CY7**
9DZ8	TR P	9EX	Min. 9	9.0	0.6	150 150	— 135	0.75 6.5	— 1.5	Audio Amplifier	120 145	— 120	1500Ω 180Ω	0.8 45	— 6	1400 7500	— 2500	100 —		**9DZ8**
9EF6	P	7S	Octal	9.4●	0.6	250 2000 Pk	250	10	2	Vertical Deflection Amplifier	250 75	250 250	−18 0	50 170	2 17	5000 —				**9EF6**
12AD7	TR+TR	9A	Min. 9	12.6 6.3	0.225 0.45	300		1.0		Non-Microphonic, Low-Hum Audio Preamplifier	250		−2	1.25		1600	62,500	100		**12AD7**
12BW4	D+D	9DJ	Min. 9	12.6	0.45	P.I.V.=1275 V.				Full-Wave Rectifier	325 V. RMS per plate, 100 ma. Output Current, Condenser Input Filter. 450 V. RMS per plate, 100 ma. Output Current, Choke Input Filter.									**12BW4**
12DE8	D P	12DE8	Min. 9	12.6	0.2	Ib=5mA 30	30			Diode Detector RF Amplifier	5 Volt Tube Drop at Ib=20mA. 12.6	12.6	−0.8	1.3	0.5	1500	0.3m		$E_{c3}=0$	**12DE8**
12DF7	TR+TR	9A	Min. 9	12.6 6.3	0.15 0.30	300		1.0		Non-Microphonic, Low-Hum Input Voltage Amplifier	250 100		−2 −1	1.2 0.5		1600 1250	55,000 70,000	100 100		**12DF7**
12DK7	D+D TE	9HZ	Min. 9	12.6	0.5	30	30	0.5		Detector & AVC Diode Power Amplifier	10 Volt Tube Drop at Ib=1.0mA. 12.6	12.6	—	6.0	1.0	5000	3500■			**12DK7**
12DQ7	P	9BF	Min. 9	12.6 6.3●	0.3 0.6	330†	165†	6.5†	1.1†	Video Amplifier	200 40	125 125	68Ω 0	26 45	5.6 16	10,500 —	53,000 —		$E_{c3}=0$ —	**12DQ7**

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§ Design center values unless noted.
† Design maximum values.
■ Load resistance.
m Megohm.

Additional Receiving Tubes (continued)

	DESCRIPTION			CATHODE		MAXIMUM RATINGS§				SERVICE	AVERAGE CHARACTERISTICS AND TYPICAL OPERATION									
TYPE	CLASS★	BASING	BASE & PINS	VOLTS	AMPERES	PLATE VOLTS	SCREEN VOLTS	PLATE WATTS	SCREEN WATTS	APPLICATION	PLATE VOLTS	SCREEN VOLTS	CONTROL GRID VOLTS OR CATHODE RES.	PLATE MA.	SCREEN MA.	TRANSCONDUCTANCE μmhos	PLATE OR LOAD■ RESISTANCE (Ω)	AMP. FACTOR(μ)	MISCELLANEOUS & WATTS OUTPUT	TYPE
12DT5	P	9HN	Min. 9	12.6●	0.6	315† 2200 Pk	285†	9†	2†	Vertical Deflection Ampl. for 110° Deflection Angle	250 75 60	250 250 150	−16.5 0 0	38 180 100	2 35 15	6200 — —				**12DT5**
12DT8	TR+TR	9DE	Min. 9	12.6	0.15	300		2.5		RF Amplifier & FM Tuner Oscillator-Mixer	250 100	— —	200Ω 270Ω	10 3.7	— —	5500 4000	10,900 15,000	60 60		**12DT8**
12DW5	P	9CK	Min. 9	12.6●	0.6	330† 2200 Pk	220†	11†	2.5†	Vertical Deflection Amplifier	200 60	150 150	−22.5 0	55 260	2 20	5500 —	15,000 —			**12DW5**
12DY8	TR TE	9JD	Min. 9	12.6	0.35	16† 16†	— 16†			Relay Service in "Signal Seeker" Applications	12.6 12.6	— 12.6	0 2.2m	1.2 14	— 2	6000 2000	5000 10,000	20 —		**12DY8**
12DZ8	TR P	9EX	Min. 9	12.0	0.45	150 150	— 135	0.75 6.5	— 1.5	Audio Amplifier	120 145	— 120	1500Ω 180Ω	0.8 0.45	— 6	1400 7500	— 2500	100 —		**12DZ8**
12EC8	TR P	9FA	Min. 9	12.6	0.225	16† 16†	— 16†			VHF Oscillator-Mixer	12.6 12.6	— 12.6	0 0	2.4 0.66	— 0.28	4700 2000	6000 0.75m	25 —		**12EC8**
12EF6	P	7S	Octal	12.6●	0.45	250 2000 Pk	250	10	2	Vertical Deflection Amplifier	250 75	250 250	−18 0	50 170	2 17	5000 —				**12EF6**
12EZ6	P	7BK	Min. 7	12.6	0.175	30	30			RF Amplifier	14 12.6	14 12.6	−0.8 −0.7	2.3 1.9	0.85 0.7	3000 2700	0.30m 0.40m		$E_{c3}=0$	**12EZ6**
12FA6	H	7CH	Min. 7	12.6	0.15	30	30			Osc.-Mixer { Self-Exc. Ext.-Exc.	12.6 12.6	Osc. Grid 2.5 0.85	Grid #3 0.5 0	.45 .67	Osc. Grid 60μa 45μa	320 300	0.8m —			**12FA6**

Grids #2 & 4 tied to plate. Grid #1 Resistance = 33KΩ

12FM6	D+D TR	7DT	Min. 7	12.6	0.15	30				Detector AF Voltage Amplifier	10 Volt Tube Drop at Ib = 2mA. 12.6 12.6	— —	— 0	1.0 1.8	— —	1300 2400	7700 5600	10 13.5		**12FM6**
12G8	TR1 TR2	9CZ	Min. 9	12.6	0.4	16†				Direct Coupled AF Driver for Transistor (TR1-Input, TR2-Output)	12.6 12.6	— —	0 to TR1 K	3.0 (TR1) 7.2 (TR2)		2600 (TR1+TR2)	8500 2000■	22 —	— 25mW	**12G8**
13DE7	TR1 TR2	9HF	Min. 9	13●	0.45	330† 275†		1.5† 7.0†		Vertical Defl. Osc. Vertical Defl. Ampl.	250 150		−11 −17.5	5.5 35		2000 6500		17.5 6.0		**13DE7**
13DR7	TR1 TR2	9HF	Min. 9	13●	0.45	330† 275†	— —	1.0† 7.0†	— —	Vertical Defl. Osc. Vertical Defl. Ampl.	250 150	— —	−3.0 −17.5	1.4 3.5	— —	1600 6500	40,000 925	68 6.0		**13DR7**
17BQ6GT	P	6AM	Octal	16.8●	0.45	550 5500 Pk	175	11	2.5	Horizontal Deflection Amplifier	250 60 150	150 150 150	−22.5 0 −22.5	55 225 (Triode Operation)	2.1 25	5500 —	20,000 —	— — 4.3		**17BQ6GT**
17C5	P	7CV	Min. 7	16.8●	0.45	135	117	5.5	1.25	Power Amplifier	120	110	−8	49	4.0	7500	2500■		1.9W	**17C5**
17R5	P	7CV	Min. 7	16.8●	0.45	150 1500 Pk	150	4.5	1.0	Vertical Deflection Amplifier	110 45	110 110	−8.5 0	40 120	3.3 17	7000 —	13,000 —			**17R5**
18DZ8	TR P	9EX	Min. 9	18.0	0.3	150 150	— 135	0.75 6.5	— 1.5	Audio Amplifier	120 145	— 120	1500Ω 180Ω	0.8 0.45	— 6	1400 7500	— 2500	100 —		**18DZ8**
6973	P	9EU	Min. 9	6.3	0.45	400	300	12	2	Push-Pull AF Power Amplifier Class AB_1— Pentode Connection	400 350 250	290 280 250	−25 −22 −15	50 58 92	2.5 3.5 7.0		8000■ 7500■ 8000■	Dist. 2% 1.5% 2%	24w output 20w output 12.5w output	**6973**
6973						375		12	1.75	Push-Pull AF Power Amplifier Class AB_1—G_2 connected to tap on output transformer.	375 Cathode current = 67 ma.		−33.5				12,500■	1.5%	18.5w output	**6973**
										Class A_1 Characteristics	250	250	−15	46	3.5	4800	73,000			

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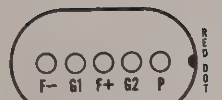
† Design maximum values.
■ Load resistance.
m Megohm.

BASING DIAGRAMS FOR ADDITIONAL RECEIVING TUBES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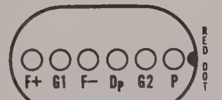
G1
F+
G2
P
RED DOT

1AG4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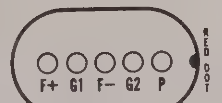
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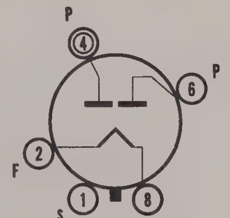
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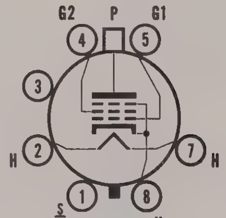
5T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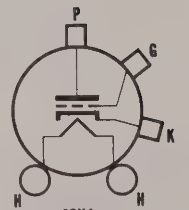
6AM



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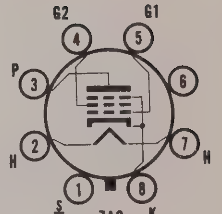
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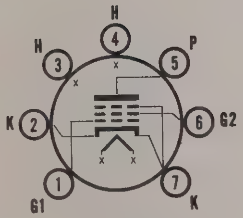
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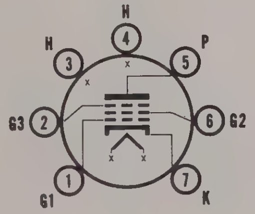
7BD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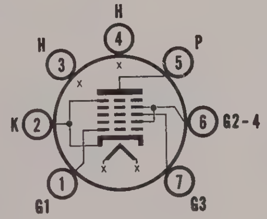
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G3

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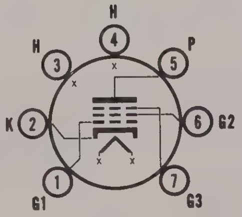
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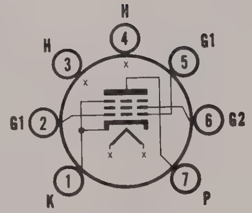
7CM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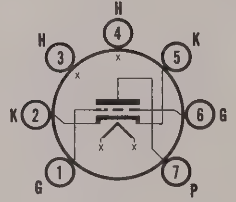
7CV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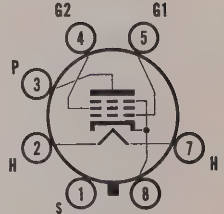
7DT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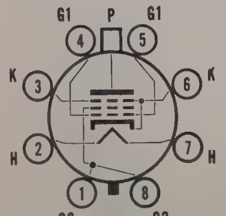
7S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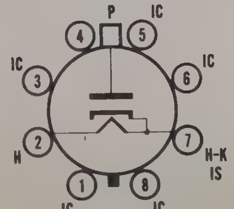
8GD


P
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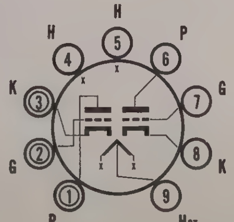
IC

8GH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8
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1
9
P
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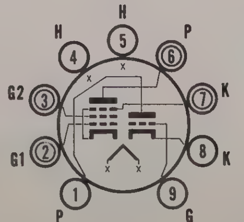
9A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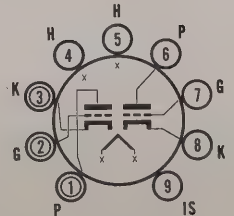
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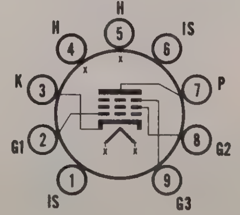
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9
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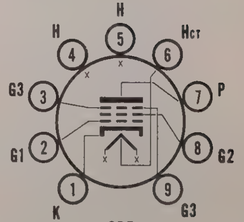
G3

9BA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5
H
4
6
HCT
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G1
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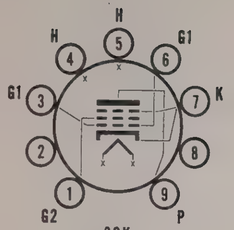
8
G2
1
9
K
G3

9BF

BASING DIAGRAMS FOR ADDITIONAL RECEIVING TUBES



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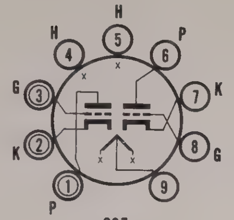

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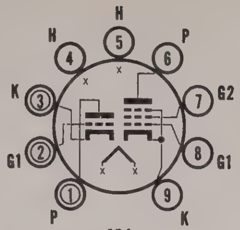
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K
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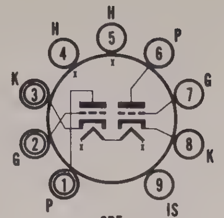
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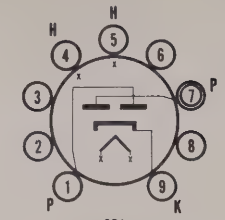

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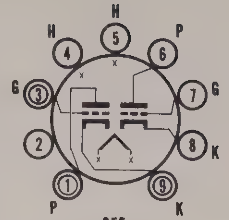

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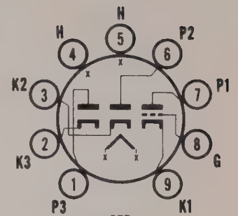
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G
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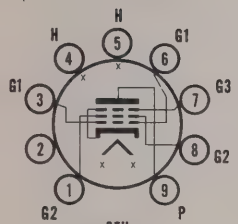
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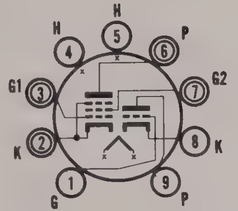
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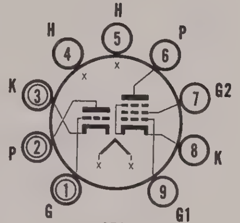
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P
G2
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G
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K
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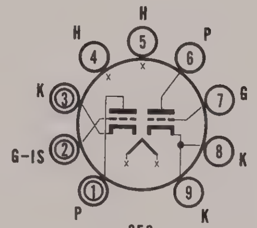
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P
G
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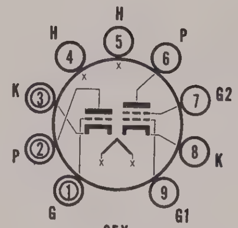
P
G-IS
K
9FC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H
P
G2
K
G1
G
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K
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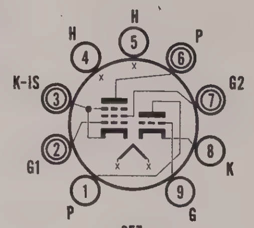
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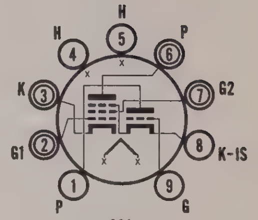
P
G2
K
G
P
G1
K-IS
9FZ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H
P
G2
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G
P
G1
K
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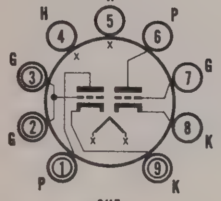

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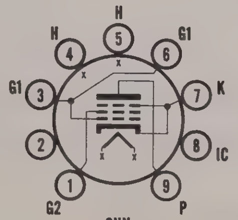
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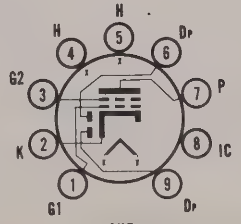
H
G1
K
IC
P
G2
G1
9HN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Dr
P
IC
Dr
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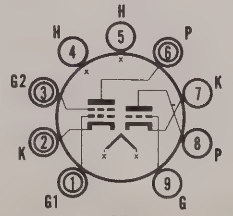
K
G2
9HZ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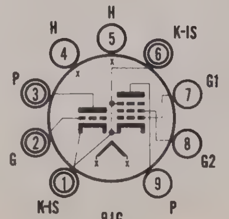
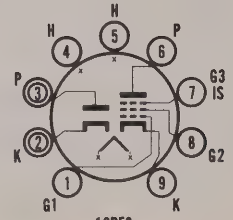
H
P
K
P
G
G1
K
G2
9JD


H
H
K-IS
G1
G2
P
K-IS
G
P
9JG


H
H
P
G3
IS
G2
K
G1
K
P
12DE8

CBS TELEVISION PICTURE TUBES (Monochrome Types)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLES	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING ($\mu\mu f$)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS	GRID 2 VOLTS	TYPE
8JP4	G, S, Re, A	Glass	105°	Self	8JL	9¼	5⅞ x 7½	No Coating	None	20,000	500	16,000	—	300	**8JP4**
9QP4A♦	G, S, Re	Glass	61°	Electro.	12AD	13 1/16	6⅛ x 7 11/16	No Coating	Single	6800	300	5500	0 to +400	200	**9QP4A♦**
14ATP4■	G, S, Re, A	Glass	85°	Electro.	12L	13½	9½ x 12 1/16	500-1000	None	14,000	500	14,000 10,000	0 to +400 0 to +400	400 300	**14ATP4■**
14AUP4★	G, S, Re, A	Glass	85°	Electro.	12L	13½	10 11/16 x 13 3/16	1000–1500	None	14,850	63●	12,000	0 to +350	50●	**14AUP4★**
14AVP4	G, S, Re	Glass	105°	Electro.	8HR	11⅝	9⅞ x 12 5/16	450–700	None	14,000	500	12,000	−50 to +350	300	**14AVP4**
14AWP4★	G, S, Re, A	Glass	85°	Electro.	12L	13 9/16	10 11/16 x 13 3/16	800–1200	None	14,000	68●	14,000 12,000	0 to +400 −50 to +350	50● 50●	**14AWP4★**
14WP4	G, S, Re, A	Glass	85°	Electro.	12L	13 9/16	10 11/16 x 13 3/16	800–1200	None	14,000	500	12,000 10,000	−50 to +350 −50 to +350	300 250	**14WP4**
17BRP4	G, S, Re, A	Glass	105°	Electro.	8HR	12⅞	12⅞ x 15¾	1000–1500	Single	15,000	500	14,000	0 to +500	300	**17BRP4**
17BWP4	G, S, Re, A	Glass	105°	Electro.	7FA	12⅝	12⅞ x 15¾	1000–1500	None	16,000	500	14,000	−50 to +350	300	**17BWP4**
17CAP4	G, S, Re, A	Glass	105°	Electro.	8HR	12 13/16	12⅞ x 15¾	1000–1500	None	16,000	500	14,000	−50 to +350	300	**17CAP4**

17CKP4	G, S, Re, A	Glass	105°	Electro.	8HR	12⅞	12⅞ x 15¾	1000–1500	None	15,000	500	14,000	0 to +500	300	**17CKP4**
17CLP4	G, S, Re, A	Glass	85°	Electro.	12L	16	12 13/32 x 15½	1800–2300	Single	16,000	500	14,000	−48 to +264	300	**17CLP4**
17CNP4	G, S, Re, A	Glass	85°	Electro.	12L	15 5/16	12 27/32 x 15 23/32	1000–1500	None	16,000	70●	14,000	0 to +400	50●	**17CNP4**
17CRP4★	G, S, Re, A	Glass	85°	Electro.	12L	15	12 13/32 x 15½	1700-2200	None	16,000	70●	14,000	0 to +350	50●	**17CRP4★**
17CSP4	G, S, Re, A	Glass	105°	Electro.	7FA	12⅝	12⅞ x 15¾	900–1400	None	16,000	500	14,000	−50 to +350	300	**17CSP4**
17CTP4★	G, S, Re, A	Glass	105°	Electro.	8HR	12 13/16	12⅞ x 15¾	1000–1500	None	16,000	500	14,000	0 to +400	300	**17CTP4★**
17CVP4♥	G, S, Re, A	Glass	105°	Electro.	8HR	12 13/16	12⅞ x 15¾	1000–1500	None	16,000	500	14,000	0 to +400	300	**17CVP4♥**
17CXP4	G, S, Re, A	Glass	85°	Electro.	12L	14 15/16	12⅜ x 15½	1000–1500	None	16,000	68●	14,000 12,000	−50 to +350 −75 to +325	50● 50●	**17CXP4**
21CMP4	G, S, Re, A	Glass	85°	Electro.	12L	19⅜	16½ x 20⅜	2000–2500	Single	22,000 22,000●	550 700●	16,000 16,000●	−64 to +352 −20 to +308	300 300●	**21CMP4**
21CQP4	G, S, Re, A	Glass	105°	Electro.	7FA	14 13/16	16½ x 20⅜	2000–2500	None	17,800	500	16,000	−50 to +350	300	**21CQP4**
21CXP4	G, S, Re, A	Glass	85°	Electro.	12L	18⅜	16½ x 20⅜	2000–2500	None	19,800	70●	18,000	0 to +350	50●	**21CXP4**
21CZP4	G, S, Re, A	Glass	105°	Electro.	8HR	15	16½ x 20⅜	2000–2500	Single	18,000	500	17,000	0 to + 500	300	**21CZP4**
21DAP4	G, S, Re, A	Glass	105°	Electro.	8HR	15	16½ x 20⅜	2000–2500	None	18,000	500	16,000 14,000	0 to +400 0 to +400	400 300	**21DAP4**
21DEP4	G, S, Re, A	Glass	105°	Electro.	8HR	15	16½ x 20⅜	2000–2500	None	18,000	500	17,000	0 to +500	300	**21DEP4**

All tubes in this section have heater ratings of 6.3 volts and 0.6 ampere unless marked.

Face-Plate Code: C—clear, Cy—cylindrical, F—frosted, G—gray, Re—rectangular, Ro—round, S—spherical, T—treated, A—aluminum.

♦Has heater voltage of 4.7 ±10% volts and heater current of 0.30 ampere.

■Has heater voltage of 8.4 volts and heater current of 0.45 ampere.

†Design-center values.

※ Internal magnetic unit to be used with external tubular magnetic shield.

§ For rectangular tubes, the horizontal deflection angle is given.

★ Has heater current of 0.45 ampere.

● With reference to Grid 1—Cathode Drive Design.

♥ Has heater voltage of 6.3 volts and heater current of 0.30 ampere.

Television Picture Tubes (continued)

	GENERAL DESCRIPTION									RATINGS†		TYPICAL OPERATION			
TYPE	FACE-PLATE (SEE NOTES)	ENVELOPE	DEFLECTION ANGLES	FOCUSING	BASING	MAX. OVER-ALL LENGTH (IN.)	MAX. DIAMETER or HT. X WD. (IN.)	CAPACITANCE OF BULB COATING (μμf)	ION TRAP MAGNET	ANODE VOLTS	GRID 2 VOLTS	ANODE VOLTS	FOCUSING VOLTS	GRID 2 VOLTS	TYPE
21DHP4	G, S, Re, A	Glass	105°	Electro.	8HR	15	16½ x 20⅜	1700–2500	None	17,800	500	16,000	0 to +400	300	**21DHP4**
21DKP4▾	G, S, Re, A	Glass	105°	Electro.	8HR	15	16½ x 20⅜	1700–2500	None	17,800	500	16,000	0 to +400	300	**21DKP4**▾
21DLP4	G, S, Re, A	Glass	85°	Electro.	12L	17⅜	16½ x 20⅜	2000–2500	None	20,000	500	16,000 14,000	0 to +400 −50 to +350	300 300	**21DLP4**
21DNP4	G, S, Re, A	Glass	85°	Electro.	12L	19⅜	16½ x 20⅜	1200–1500	Single	19,800	500	16,000	−64 to +352	300	**21DNP4**
21DQP4	G, S, Re, A	Glass	85°	Electro.	12L	17⅞	16½ x 20⅜	2000–2500	None	18,000	500	16,000	−50 to +350	300	**21DQP4**
21DRP4	G, S, Re, A	Glass	85°	Electro.	12L	18⅝	16½ x 20⅜	2000–2500	None	20,000	500	16,000	0 to +450	300	**21DRP4**
21DSP4	G, S, Re, A	Glass	85°	Electro.	12L	18⅜	16½ x 21½	2000–2500	None	20,000	68●	16,000 14,000	0 to +400 −50 to +350	50● 50●	**21DSP4**
24AEP4	G, S, Re, A	Glass	85°	Electro.	12L	19½	18 9/16 x 22 11/16	2000–2500	None	20,000	500	18,000	−50 to +350	300	**24AEP4**
24ALP4	G, S, Re, A	Glass	105°	Electro.	8HR	15 9/16	18⅝ x 22 13/16	2000–2500	None	20,000	500	17,000	0 to +500	300	**24ALP4**
24ANP4	G, S, Re, A	Glass	85°	Electro	12L	20½	18 9/16 x 22 51/64	1700–2500	Single	19,800	500	18,000	−72 to +396	300	**24ANP4**

24AQP4★	G, S, Re, A	Glass	105°	Electro.	8HR	16 3/16	18 5/8 x 22 13/16	1700–2500	None	19,800	500	16,000	0 to +400	300	**24AQP4★**
24ASP4♥	G, S, Re, A	Glass	85°	Electro.	12L	19½	18 9/16 x 22 51/64	1700–2500	None	19,800	500	18,000	0 to +400	300	**24ASP4♥**
24ATP4	G, S, Re, A	Glass	85°	Electro.	12L	19½	18 5/8 x 22 7/8	2000–2500	None	20,000	68●	18,000 14,000	0 to +400 −50 to +350	50● 50●	**24ATP4**

All tubes in this section have heater ratings of 6.3 volts and 0.6 ampere unless marked.

Face-Plate Code: C—clear, Cy—cylindrical, F—frosted, G—gray, Re—rectangular, Ro—round, S—spherical, T—treated, A—aluminized.

♦Has heater voltage of 4.7 ±10% volts and heater current of 0.30 ampere.

■Has heater voltage of 8.4 volts and heater current of 0.45 ampere.

†Design-center values.

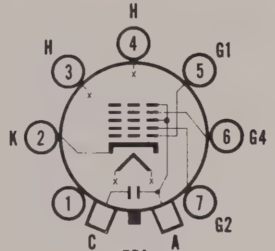
⋇ Internal magnetic unit to be used with external tubular magnetic shield.

§ For rectangular tubes, the horizontal deflection angle is given.

★ Has heater current of 0.45 ampere.

● With reference to Grid 1—Cathode Drive Design.

♥ Has heater voltage of 6.3 volts and heater current of 0.30 ampere.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H
G1
K
G4
C
A
G2
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2
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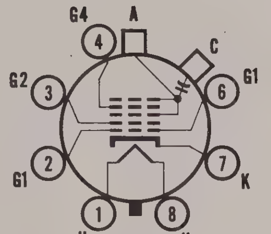
7

7FA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2
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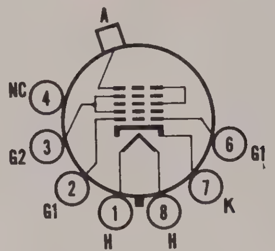
8

8HR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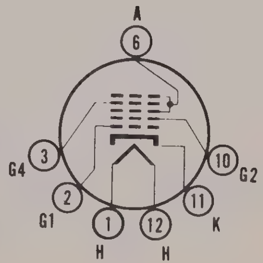
8JL


A
G4
G2
G1
K
H
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2
3
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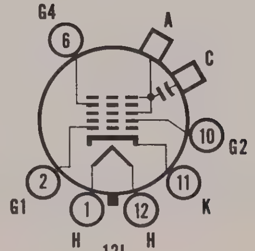
11
12

12AD


G4
A
C
G2
G1
K
H
H
1
2
6
10
11
12

12L

CBS GERMANIUM AND SILICON DIODES

Type	Outline Drawing	MAXIMUM RATINGS, 25°C ambient					ELECTRICAL CHARACTERISTICS, 25°C ambient					Description
		Peak Reverse Voltage	Operating Reverse Voltage	Forward Current, ma			Minimum Forward Current at +1V ma	Maximum Reverse Current				
				Average ††	Recurrent Peak	Surge 1 sec.		Volts	μa	Volts	μa	
1N34	A & B	75	60	40	150	500	5.0	−10	50	−50	500	General Purpose
1N34A	A & B	75	60	50	150	500	5.0	−10	30	−50	500	General Purpose
1N35*	A	75	60	50	150	500	7.5 Δ	−10	10			Matched Pair
1N38, 1N38A, 1N38B	A & B	120	100	50	150	500	4.0 to 25.0	−3	6	−100	500	High Reverse Voltage
1N39, 1N39A	B	225	200	50	150	200	5.0	−100	65	−200	325	High Reverse Voltage
1N40*	D	75	60	40	150	500	12.75 at 1.5V Δ	−10	50	−50	600	Quad Demodulator
1N42*	D	125	100	50	150	500	12.75 at 1.5V Δ	−3	6	−100	625	Quad Demodulator
1N48	A & B	85	70	50	150	400	4.0	−50	833			General Purpose Detector
1N51	A & B	50	40	25	100	300	2.5	−50	1660			General Purpose
1N52	A & B	85	70	50	150	400	4.0	−50	150			General Purpose
1N54	A & B	50	35	40	150	500	5.0	−10	10			General Purpose
1N54A	A & B	75	50	50	150	500	5.0	−10	7	−50	60	General Purpose
1N55, 1N55A	B	170	150	50	150	500	4.0	−100	300	−150	500	Gen. Purpose, High Reverse Voltage
1N55B	A	190	150	30	150	500	5.0	−150	500			Gen. Purpose, High Reverse Voltage
1N56, 1N56A	A & B	50	40	60	200	1000	15.0	−30	300			High Conduction
1N58, 1N58A	A & B	120	100	50	150	500	5.0	−100	600			High Reverse Voltage
1N60	A	30	25	30	150	500	3.0			−10	67	Video Detector
1N63	A & B	125	100	50	150	400	4.0	−50	50			General Purpose
1N64	A & B	20	15							−10	200	Video Detector
1N65	A & B	85	70	50	150	400	2.5	−50	200			General Purpose
1N67, 1N67A	A & B	100	80	35	100	500	4.0	−5	5	−50	50	Gen. Purpose, High Reverse Resistance
1N68A	A	130	100	30	100	500	3.0	−100	625			Gen. Purpose, High Reverse Voltage
1N69, 1N69A	B	75	60	40	125	400	5.0 to 25.0	−10	30	−50	500	General Purpose
1N70, 1N70A	B	125	100	30	90	350	3.0 to 25.0	−10	25	−50	300	General Purpose
1N71*	D	50	40	60	200	1000	15.0 Δ	−30	300			Quad, High Conductance Bridge Ckt.

1N73*	D	75	60	22.5	60	100	15 at 1.3 to 1.7V △	−10	50			Quad, Bridge Circuit
1N74*	D	75	60	22.5	60	100	15 at 1.2 to 1.8V △	−10	50			Quad, Bridge Circuit
1N75	A & B	125	100	50	150	400	2.5	−50	50			General Purpose
1N81, 1N81A	B	50	40	30	90	350	3.0 to 25.0	−10	10			General Purpose
1N82A♦	A, B & C		5		Designed for efficient low-noise mixer operation from 470 to 890 mc							Silicon—UHF Mixer
1N90	A	75	60	40	150	500	5.0	−50	800			General Purpose
1N116	A	75	60	30	—	—	5.0	—	—	−50	100	High Resistance, Gen. Purpose
1N126, 1N126A	A	75	60	30	90	350	5.0 to 25.0	−10	50	−50	300	General Purpose, JAN
1N127, 1N127A	A	125	100	30	90	300	3.0 to 25.0	−10	25	−50	200	General Purpose, JAN
1N128	A	50	40	30	90	300	3.0	−10	10			General Purpose, JAN
1N191♠	A	105	70	50	150	500	5.0	−10	25	−50	125	Computer, Fast Recovery Time (IBM Type F)
1N192♠	A	80	55	50	150	500	5.0	−10	50	−50	250	Computer, Fast Recovery Time (IBM Type G)
1N198 at 25°C	A	100	80	30	90	300	4.0	−10	10	−50	40	High Temp., High Reverse Resistance, JAN
at 75°C			60				5.0	−10	75	−50	250	
1N636	A	60	45	30			2.5	−10	10			High Resistance, Gen. Purpose

INDIUM-BONDED JUNCTION DIODES†

1N270	A	75	60	90	325		200	−10	−75 at 75°C	−50	100	Computer
1N276	A	100	80	40	150		40	−10	20	−50	100	Computer (IBM Type W)
1N497	A	30	20	80	250		100	−20	20			Computer
1N498	A	50	40	80	250		100	−40	25			Computer
1N499	A	65	50	80	250		100	−50	30			Computer
1N500	A	75	60	80	250		100	−60	40			Computer
1N501	A	100	80	80	250		100	−80	40			Computer
1N502	A	125	100	80	250			−100	50			Computer
1N699	A	105 at 70°C	80	80	250		100	−75 at 70°C	250			Computer (Burroughs Type H)

♦Units are tested for noise figure in instruments designed to correlate with customer applications.

*Characteristics are for each diode.

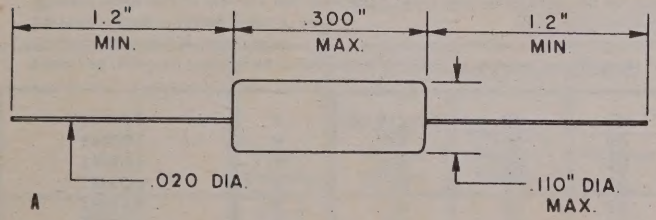
♠Reverse characteristics measured at 55°C.

†Bonded diode reverse recovery test using JETEC 14.5-1 (IBM Modified Y) test kit. 1N699: Recovery to 50K within t = 0.3μs. All others: Recovery to 80K within t = 0.3μs.

††All glass point-contact diodes are rated at 30 mA for 80 mW dissipation. Currents given over 30 mA are for the plastic case.

△ Matching 1N35—Current at +1.0V matched within 10%.
1N40, 1N42—Resistance of diodes in each pair matched within 3Ω at +1.5V.
1N71—Current of all four diodes matched within 1 ma at +1.0V.
1N73—Resistance of diodes in each pair matched within 2Ω at +15.0 ma d-c.
1N74—Resistance of diodes in each pair matched within 6.7Ω at +15.0 ma d-c.

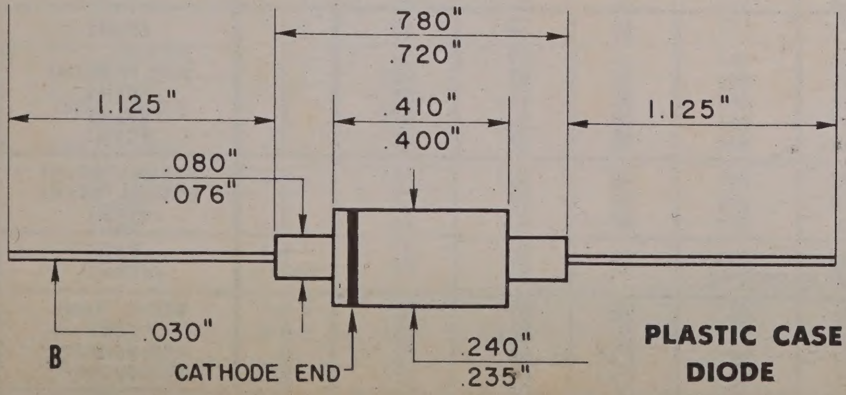
PHYSICAL TYPES AVAILABLE FOR GERMANIUM AND SILICON DIODES


1.2"
MIN.
.300"
MAX.
1.2"
MIN.
.020 DIA.
.110" DIA.
MAX.

A

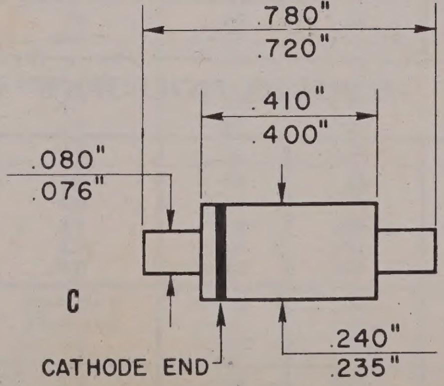
GLASS-ENCASED DIODE

EIA standard color code bands are placed on the cathode end of all CBS-Hytron subminiature glass diodes. The three-band color code reads from left to right and indicates the figures following the "1N" prefix.


.780"
.720"
1.125"
.410"
.400"
1.125"
.080"
.076"
.030"
CATHODE END
.240"
.235"

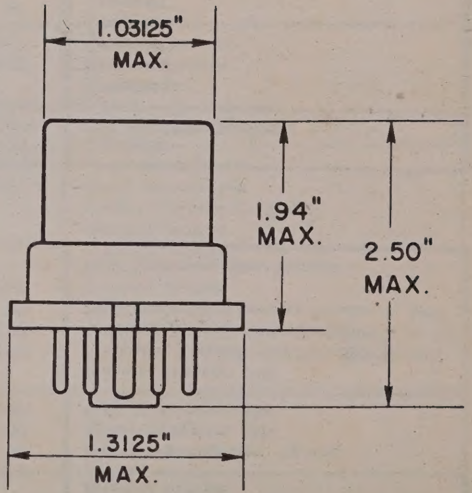
B

PLASTIC CASE DIODE


.780"
.720"
.410"
.400"
.080"
.076"
CATHODE END
.240"
.235"

C

PLASTIC CASE DIODE . . . CLIP-IN TYPE


1.03125"
MAX.
1.94"
MAX.
2.50"
MAX.
1.3125"
MAX.

D

QUAD WITH STANDARD OCTAL BASE WILL BE SUPPLIED FOR ANY CBS DIODE

NOTES ON USE

Electron Tube Outline Drawings: If more than one outline applies, the most common or current type is illustrated. Base style is indicated inside bulb to aid identification.

Application Descriptions: The descriptive line preceding the electrical data is the most general use for the device.

Basing Diagrams: Electron tubes have diagrams founded on the RETMA standards. Each pin is labeled with its principal connection. Secondary elements internally connected may not be indicated in the pin label. Transistor basing diagrams in this handbook originate with CBS-Hytron and indicate symbolically the element connections.

Basing Diagram Key: P—plate; G—grid; G1—grid 1, etc; G2-4—grid 2 and 4 internally connected, etc; K—cathode; IS—internal shield; IC—internal connection (do not use); $\frac{S}{NC}$—shell for metal envelopes or no connection for glass envelopes; TAR—target; SA—starter; DP—diode plate; H—heater; HCT—heater center tap; F—filament; FCT—filament center tap; A—anode, in picture tubes includes internally connected grids and internal coating, sometimes called the ultor; C—external conductive coating of picture tubes. Transistor leads and pins: E—emitter; C—collector, B—base.

NOTE: Double circled pins connect to elements of Section 2 in multiple section tubes.

RECEIVING TUBES
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PICTURE TUBES
PICTURE TUBE GUIDE
SEMICONDUCTORS
SPECIAL PURPOSE TUBES
APPENDIX

ELECTRON TUBES

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